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OBSERVATIONS

ON

HOSPITAL GANGRENE,

WITH REFERENCE TO THE DISEASE CHIEFLY AS IT APPEARED IN THE BRITISH ARMY DURING THE LATE WAR IN THE PENINSULA.

By J. Boggie, M. D. Surgeon to the Forces.

The efforts of nature are in nothing more conspicuous than in repairing the various injuries incident to the living body from wounds and other accidents; but causes occasionally supervene to counteract these efforts, which nature, unaided, is unable to overcome, and which terminate often not only in the destruction of a part of the body, but even in that of life.

Of these causes, none appear to me more deserving of an attentive consideration than Hospital Gangrene, which I propose as the subject of the following observations, and which may be regarded as the most serious affection to which wounded surfaces are liable; as it destroys without distinction, and involves in one common mass, all the textures which it attacks. It has, in this country, been denominated

Contagious Gangrene, Phagedæna gangrænosa, Malignant Ulcer, Putrid Ulcer, Sloughing Sore; and by the French writers, Gangrene humide des Hôpiteaux, Pourriture d'Hôpital: I shall use the name Hospital Gangrene, as a general term, and point out what I wish to be understood by that of Contagious Gangrene and Phagedæna Gangrænosa.

This affection prevails in various situations, but it is seen in its most aggravated forms in military hospitals; and deplorable, indeed, are the consequences sometimes resulting from it; so that perhaps there is no disease more destructive than this to an army on service. During the late war in the Peninsula, if I mistake not, there was no malady more fatal, in proportion to the numbers affected by it; nor was there any by which a greater number of men were rendered unfit for further service. To the military surgeon, in particular, it must be an object of the deepest interest.

No doubt much valuable information is to be found in the works of those who have lately written on this subject; but authors differ so much in the relations which they have given as to the nature of the affection, its causes, and treatment, that it would be difficult indeed for any one who had not had frequent opportunities of witnessing the disease, to say which author is the most correct. I shall, therefore, endeavour to give an account of the disease as it occurred to myself, together with the practice followed, as also what I conceive to be its causes; mentioning at

the same time the opinions of some of those writers who have described the same affection.

There is no reason to believe Hospital Gangrene to be a disease of recent origin: it must have existed from the earliest period; and, accordingly, we find allusion made to it, or, at least, a gangrenous affection supervening to wounds and ulcers, related in the works of the oldest writers. The only doubt whether the disease mentioned by them is the same as that under consideration, seems to arise from their not having noticed its contagious nature; that circumstance, however, I conceive is no proof of its not being the same disease; for it would appear that the ancients were but little acquainted with the subject of contagion and infection, and that point even now is by some disputed.

Although it was observed by Lamotte in the Hotel-Dieu of Paris in 1722, no one before Pouteau, whose posthumous works were edited in 1783, seems to have described it very minutely. Since that time, however, many writers have given it a place in their works, and some separate essays on the subject have been published.

Hospital Gangrene has been found to prevail very often in ships of war, and in naval hospitals, where great numbers of wounded had been crowded together. It has also existed in hospitals by no means crowded, and where every attention was paid to ventilation; and it has been known to prevail, and that extensively, among wounded who had never been in hospital, as I shall afterwards relate. It shews

itself at all seasons of the year; but authors are not agreed as to that in which it chiefly prevails. Boyer seems to think that it is most frequent after the great heats of summer, and during a continuance of southerly winds *. I hope to be able to prove that it will be found in its greatest virulence during a continuance of very hot weather.

There are two forms under which Hospital Gangrene usually appears. The first I would name Contagious Gangrene; the second Phagedæna gangrænosa. Professor Delpech of Montpellier, who has given a very excellent account of this disease, mentions four different forms. The first he denominates the Ulcerous (Ulcereuse). The second the Pulpous (Pulpeuse). The third and fourth seem to be varieties of these two†.

When a wound or ulcer is affected with Contagious Gangrene, it becomes painful and swollen, loses its healthy florid appearance, and the granulations, which were small and distinct, become flabby, and appear sometimes as if they were distended with air; at other times, vesicles containing a watery coloured fluid, or bloody serum, have been observed, and the sensation in the sore has been described as resembling the stinging of a gnat. The secretion of pus is suspended; the wound is dry, and covered with a tenacious viscid ash-coloured

* Vide Traité de Maladies Chirurgicales, tom. i. p. 321.

† Vide Memoire sur la Pourriture d'Hopital, p. 4. et seq.

matter, which adheres firmly to the surface. When this morbid state has existed for some time, a discharge takes place of a thin ichorous matter, of a very peculiar smell; the pain encreases, the edges of the wound are reverted, and in general assume a circular form; an erysipelatous redness surrounds the wound, and sometimes extends to a great distance, even over a whole limb; the neighbouring glands, as those of the axilla or groin, swell, inflame, and sometimes suppurate; febrile symptoms become apparent; the pulse is accelerated, full and strong; the heat of the surface is much increased; the patient complains of nausea and thirst; the tongue is covered with a whitish or brown crust, and the bowels are in general constipated. The inflammation goes on increasing, the thin ichor continues to be discharged in great quantity, and a thick slough, apparently of coagulable lymph, covers the whole surface of the wound; the fetor becomes intolerable, and the pain quite insupportable. In the last stage, there is in general an oozing of blood from the surface of the wound, and not unfrequently distinct hæmorrhage, from the corrosion or destruction of the larger bloodvessels. Sphacelus takes place to a greater or less extent; the strength of the patient fails; the pulse sinks; his countenance becomes collapsed and altered; the skin is bedewed with a clammy sweat; and a diarrhœa with hiccup coming on, the scene very soon terminates.

Though this is the most common form of the disease which I have seen, as it occurs in a recent wound, and in strong healthy men, who are the ordinary subjects of it, yet I am well persuaded that the fever which accompanies Hospital Gangrene is not always of so phlogistic a character. It has been often observed to partake more of a typhoid type; and it is of the utmost consequence in practice to attend to this distinction, as it will be found, that what would be a valuable remedy in the one case, might, if carried to any extent, be very pernicious in the other. The not attending sufficiently to this circumstance, that is, to the phlogistic or typhoid type of the fever, has, I am convinced, often led to fatal mistakes, and seems to be partly at least the cause of that great diversity of opinion among medical men regarding the best mode of treating this very dangerous affection.

The other form in which Hospital Gangrene usually manifests itself is more of a chronic nature; appearing then seldom in a recent wound. Most of the cases which I have seen of it have been in those of some standing, and in patients who had been long in hospital, many of whom had suffered attacks of Hospital Gangrene in the more acute form; after recovering from which, and when the wound was to all appearance doing well, the granulations healthy, secreting good pus, and sometimes even nearly cicatrized, a small dark-coloured spot or ulceration has appeared, most commonly on the edge of the sore,

varying in its dimensions from the size of a millet seed to that of a split pea.

This little ulceration was in general of a circular form, its edges ragged, its bottom unequal and excavated, and secreting a matter of a very peculiar smell. Ulcerations of the same kind not unfrequently appeared in other points, which, spreading in all directions, united, and soon extended over a great part of the wounded surface. At times, this ulceration has been known to go on, and to cause very considerable destruction of parts, without the system appearing to be much affected by it; but most frequently after it had spread to a certain extent, symptoms denoting constitutional irritation became apparent; these were nausea and loss of appetite, thirst, foul tongue, restlessness, a small and quick pulse, and heat of skin. After the febrile symptoms had appeared, the progress of the ulceration was more rapid, and very often extended beyond the limits of the original sore; the discharge became bloody, and the fetor peculiar to this affection more offensive. Sphacelus in many instances took place, and some time before death the same train of symptoms occurred, already described as taking place in the last stage of the more acute form of the disease. This is the depascent, or phagedenic, form of Hospital Gangrene, or what may be called Phagedæna gangrænosa.

It would appear, that, in the milder cases of this disease, the skin and cellular membrane are the parts originally and principally concerned, and that

it may sometimes be confined to these textures; but that, in more violent cases, one structure is destroyed after another, so that the muscles, ligaments and tendons, together with the bloodvessels and nerves, are involved in the disease, become disorganised, and slough off; even the periosteum is not exempt from its influence, and the bones being deprived of their covering, very often become affected with caries.

The duration of the disease varies in different individuals. If not checked by the operation of remedies, it may continue for a period of from fourteen to twenty days, or even longer; but it often terminates much sooner, sometimes as early as the third, fourth, or fifth day, either in recovery or death. When once attacked, the patient, even when convalescent, is very liable to suffer a relapse, and repeatedly, too, as I myself can testify; and Dr Hennen mentions a case in which the patient survived twelve different attacks, but sunk under the thirteenth *. Under such circumstances, it was not to be expected that they could ultimately recover; accordingly most of those so affected, being completely exhausted, lingered for a time, and then sunk under the hectic fever which invariably attended.

When a patient is beginning to recover from this disease, there is an abatement of the febrile symptoms; the local inflammation subsides, healthy pus is secreted, small florid granulations spring up, and the

* Military Surgery, p. 225.

sloughs separate without being renewed. Specific sores, such as venereal, scrophulous, and variolous, are thought to be less liable to this affection than simple sores. This may perhaps be the case in some degree, but they are by no means altogether exempt; it has been repeatedly seen to attack cancerous and venereal sores *; and a case is mentioned by Dr Hennen of a soldier of the Waggon Train who was sent into the hospital at Bilboa, with an open bubo in the groin, and under the influence of mercury, who was carried off by this disease in 48 hours,—the gangrene affecting the sore almost instantly, eroding the great vessels in the neighbourhood, and destroying the abdominal parietes to a a great extent †. This case I witnessed myself.

In that form of the disease which appeared in the Artillery Hospital at Woolwich, as described by Dr Rollo, specific sores were not affected, though such patients were in the same wards. This is just what I should have expected; that form of the disease being apparently purely local, and not having the power of extending its influence, at least through the medium of the atmosphere.

A great peculiarity in the phagedenic form of the disease is, that different actions, such as the ulcerating, suppurating, and cicatrising, may frequently be seen going on in one sore at the same time. During the prevalence of the Hospital Gangrene at Bilboa, this peculiarity was often observed; the

* Thomson's Lectures on Inflammation, p. 460.
Military Surgery, p. 218.

same thing was remarked by Dr Rollo at Woolwich *.

After military punishments, in consequence of neglect or other causes, Hospital Gangrene sometimes occurs; and from what has been stated in the description of the disease, the appearance and consequences of it may be easily imagined. Happily, however, for the sake of humanity, corporal punishments, both in the navy and army, are now inflicted with much greater discretion, and indeed are but seldom heard of; though it is yet to be lamented, that it has been judged inexpedient to dispense with them altogether. In warm climates phagedæna is very liable to ensue from this cause; and it is perhaps not out of place here to mention, that the most effectual remedy in speedily healing such wounds, and, consequently, in preventing the bad effects which sometimes result from them, is the immediate application of a spirituous embrocation. The aqua ardente, a sort of brandy which was issued to the troops in Portugal and Spain, I found most beneficial in such cases: for the first 24 hours I was accustomed to use it undiluted, and after that time mixed with water, or a solution of acetas plumbi, much on the same principle as oil of turpentine and spirituous applications have been employed in scalds and burns.

From all the phenomena of the disease, we may be warranted, I think, in considering Hospital Gan-

* Treatise on Diabetes, vol. ii. p. 261.

grene, more especially that form of it named Contagious Gangrene, to be a peculiar inflammatory action attacking wounded surfaces; varying in its character according to the constitution of the patient, type of the accompanying fever, and other circumstances; nearly allied to erysipelas, if, indeed, it be not a modification of that disease, and depending on a diversity of causes, as I shall endeavour to make apparent.

The causes which induce this affection have never been very satisfactorily explained, nor do practitioners seem to be yet agreed upon the subject. The foul air of crowded hospitals has always been considered a chief cause of Hospital Gangrene, and that it is so, cannot reasonably be doubted. I am aware, however, that even this has been called in question by some writers; but the general testimony of authors on this point is, I conceive, too strong to be controverted, and, indeed, the records of public hospitals bear ample proof of the truth of the opinion. But, again, we are told that there is no hospital, however small, airy, or well regulated, where this disease may not at times prevail *; and that it has been known to appear among wounded who had not been in hospital at all †.

Thus it appears that Hospital Gangrene may exist, independently of this as a cause; that it is not exclusively confined to hospitals, as has been sup-

* J. Bell's Principles of Surgery, vol. i. p. 108.

† Rollo on Diabetes, vol. ii. p. 262.

posed; and that the vitiated air of such establishments, though considered by some to be the sole cause of the disease, is but one of the many by which it may be produced.

Monsieur Delpech is of opinion that the infection of typhus fever, the exhalations from the dejections of dysenteric patients, and even from common gangrene, more especially that named Gangræna senilis, by their immediate action on the surface of the wounds, rather than by their hurtful influence on the general system, are the most frequent sources of this affection. Indeed, from the observations of this distinguished Professor, one would suppose that almost all the cases of Hospital Gangrene which he saw during so many years of the late war, owed their origin to one or other of these causes.

I am myself inclined to believe, that, under particular circumstances, all those which have been mentioned may at times produce this disease; though one might be led to suspect that in hospitals said to be crowded and ill-aired, and where nuisances are allowed to collect, or are not speedily removed, other and less equivocal causes of Hospital Gangrene may at the same time be found to exist. What these are I shall now proceed to consider.

1. *Particular States of the Atmosphere.*

It has been often observed, that, in certain seasons, wounds, whether received in battle, or in consequence of operations, and even old sores, become

affected with Hospital Gangrene, but what these states are, has not been very well ascertained.

Hospital Gangrene has been known to prevail at all seasons of the year, but, as far as my observation goes, in hot weather much more frequently and severely than in cold.

It is well known that in hot climates, in addition to the general excitement of the system, all the secretions and excretions are more acrid, and, in a very particular manner, the secretion from sores, which is both very abundant and extremely irritating. During the prevalence of the gangrene at Bilboa, and when it was at its very height of malignancy, of which so animated an account is given by Dr Hennen, in his Principles of Military Surgery, p. 210, *et seq.*, the thermometer in the shade seldom stood below 75° of Fahrenheit, and often much higher. In the wards of the Hospital I have seen it at 85°, and in the sun upwards of 120°; indeed, I know of no exception to this fact of hospital gangrene prevailing most in hot weather, for I have constantly found, that, in the warm months, the disease raged in its greatest virulence. I am therefore inclined to consider a greatly heated atmosphere to be one of the most powerfully exciting causes of this disease.

2. *Inattention to Cleanliness.*

When the discharge of a sore, particularly in warm weather, is long confined, the dressings not frequent-

ly renewed, and the wound cleaned by careful ablution, such changes take place in the matter discharged, as to alter its nature altogether; it becomes exceedingly acrid, and even poisonous, and cannot fail to produce the worst possible effect upon the sore.

This appears to me to be a very frequent cause of Hospital Gangrene, that form of it, in particular, termed Phagedæna, and, if I am not mistaken, was the source of the disease in some instances, as it occurred at Passages in Spain, so well described by Mr Blackadder.

In shewing that the disease could not be occasioned by the foul air of an hospital, but without attempting any explanation of the fact, that gentleman relates a case, which I shall take the liberty of transcribing.

"Three men, who had been severely wounded and taken prisoners, were carried to an open building, which had apparently been used as a stable, but which had not been recently occupied. After having been repeatedly pillaged, they were ultimately abandoned, and the only articles left with them were a few pieces of biscuit, a canteen of water, one sheet, one pair of trowsers, a pair of old shoes, and an old great-coat. In this miserable situation they remained for three days, when they were fortunately discovered, and some provisions and clothing being provided for them, they were put into an open boat under the charge of two fishermen. Had the wind proved favourable, a few

hours sailing would have brought them to an hospital, but it was the winter season, and they were overtaken by a storm of wind, rain, and sleet, to which they were exposed for nearly two days and a night, and when they at last got to an hospital, the wound of one of these unfortunate men was discovered to be affected with this disease."*

Now, the explanation of this case appears to me to be very easy. In all probability the wounds of these men had been entirely neglected, and the only surprising thing is, that they were not all affected with gangrene; but had it been the summer season, and had they been exposed to the other causes about to be mentioned, we should have had a very different account of them. The chances are, that before they had reached Passages, the gangrene must have made such progress that they should all have been in an advanced stage of the disease, and perhaps irrecoverably gone; but the cold to which they had been exposed, and the very spare diet on which, from necessity, they had been obliged to subsist, had, in my opinion, contributed to their safety. And, in that form of the disease, also, which prevailed in the Artillery Hospital at Woolwich, described by Dr Rollo, nothing appears to me more clear, than that want of cleanliness was the chief, indeed apparently the sole, cause of the disease there. Dr Rollo confesses, that the

* Blackadder on Phagedæna gangrænosa, p. 45.

wounds were seldom washed, and that the matter was allowed to form encrustations around the edges of the sores, and this, the Doctor says, arose from the opinion of some, that the washing of sores, if it did no harm, was at least superfluous. He suspected also, that the poison was propagated from one sore to another by means of the sponge employed in the occasional washing or wiping, the same sponge having been unguardedly used for different sores.*

3. *Acrid or Irritating Applications.*

These may be considered another cause, or at least may contribute very effectually to the production of this disease.

This is one great objection to the use of ointments; for when long kept, they invariably become rancid, and irritate extremely. After a continued use of such ointments, or even after a single application of this kind, I have not unfrequently seen the character of a sore entirely changed, and, from a healthy ulcer, secreting good pus, to become irritable, inflamed, and very painful, the granulations to disappear, the surface to become glassy, and discharge a thin acrid sanies, very fetid, and to be brought to a state, if not actually of Hospital Gangrene, at least somewhat approaching to it. On this subject

* Vol. ii. p. 266.

the suggestions of Sir Everard Home are well worthy of attention *.

4. *Stimulating Food.*

It has been thought that the disease may be occasioned by a change of food, as from a vegetable diet, to one consisting chiefly of animal matter; and I have myself very little doubt but that it may contribute to that effect.

The diet of soldiers, on service particularly, is very stimulating, consisting in a great measure of animal food, with a daily allowance of wine or spirits; and I have on many occasions seen, for days together, the diet made up altogether of animal, without any admixture of vegetable matter. This, to be sure, is not their ordinary fare; but it cannot fail, in my opinion, to induce a state of the system highly favourable to the production of this disease,—to men in health it may be considered a predisposing cause, and to the wounded, a powerfully exciting cause of Hospital Gangrene.

The diet of seamen in the navy was formerly pretty much the same as that of soldiers on service, or perhaps even more stimulating, for the allowance of wine and spirits made to them was greater; and we know how liable they have always been to this affection; but, by a most judicious regulation lately

* *Vide* Home on Ulcers, p. 39.

made by the Navy and Admiralty Boards, and sanctioned by His Majesty, I find that the rate of seamen's diet, has been entirely altered; consisting now of a much greater proportion of vegetable matter, and that the ration of spirits is much reduced; which cannot fail, I should imagine, in every point of view, to be attended with the greatest benefit to the service. Dr Trotter appears to me to have most correct notions on this point*.

The importance of the subject of dieting troops, more especially in tropical climates, has been most particularly attended to, and pointed out, by that excellent officer General Stewart, who, during a long period of varied services, seems to have overlooked nothing that could tend, in any way, to the comfort or benefit of the soldier, or to the advantage of the State; in a work, which, while it reflects the highest credit on the author as a commander and a historian, has, at the same time, in an eminent degree, exalted the character of his countrymen †.

5. *Intemperance in the Use of Wine and Spirituous Liquors.*

It is hardly possible to imagine any thing more likely to produce Hospital Gangrene, than the abuse of wine and spirituous liquors; and I have

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* *Vide* Medicina Nautica, vols. ii. and iii.

† *Vide* Stewart's Sketches of the Character of the Highlanders, &c. vol. i. p. 357, and vol. ii.

been long inclined to consider this to be one of the most powerfully exciting causes of the disease. In that very violent form of Hospital Gangrene, which prevailed at Bilboa in the summer and autumn of 1813, whatever other causes might have contributed to the production or continuance of the disease, there is not a doubt in my mind, but that it was rendered much more virulent, and that it was even perpetuated in the hospitals there, by the use of wine and other stimulants, injudiciously administered. From an idea which very generally prevailed, that the accompanying fever was Typhus, and that Hospital Gangrene could not be prevented, or successfully treated, unless by stimulants, antiseptics, and tonics, a liberal allowance of wine was made to every patient as a preventive; and, when the disease actually appeared, it was then prescribed in increased quantity as a cure; the consequence of which was, a fatal termination in almost every case. On this point I am very sorry to be obliged to differ so widely in opinion from my friend Dr Hennen.

It will be seen from the account which he has given of the Hospital Gangrene at Bilboa,—that, from the view which he took of the disease, and in order to reconcile the mode of treatment which was first established, with that which was ultimately adopted, he considered the fever, in the first instance, and during the hot weather, to be of a typhoid character, and that its type altered, or became inflamma-

tory, when the cool weather set in. Now, this is not what might *à priori* be expected, and is very different from the opinion one would naturally entertain on the subject. The fever appeared to me, from the first, to be highly inflammatory, that is immediately after the injury was received, and at a time when the heat of the season was at its maximum; and that it became more mild when the temperature fell, or when the sedative effect of the cold began to be felt; but it was not until the antiphlogistic treatment was fully established, that any remarkable decrease in the mortality took place. The tabular views annexed, will shew at once the difference from the opposite modes of treatment which were pursued.

Dr Trotter, who appears to be perfectly well aware of the causes of this disease, as it occurred in the navy, has some very judicious remarks on this subject, under the head of Malignant Ulcer. He observes, "When a disease, like the one in question, which has usually appeared in a warm country only, comes to shew itself in a cold climate, it is reasonable to conclude that there must be some similarity in the causes which produce it in both situations." And, after giving a detailed, but by no means an exaggerated statement of the excesses which seamen commit, whenever an opportunity offers, he adds, "If the body suffers a diminution in its excitement, between the West Indies and Plymouth Dock, with all deference to the licensing magistrates, the landlord has in his possession what can

quickly stimulate beyond solar influence*." And Mr John Bell, in his remarks on Hospital Gangrene, after adverting to the irregularities which he witnessed during the period of his visit to Yarmouth Hospital, confirms Dr Trotter's statement, by giving, no doubt, rather a ludicrous, though I dare say a faithful, account of what he saw; and certainly quite in accordance with the habits of British seamen†.

To illustrate this still further, and to shew how soon this affection may be brought on by an improper regimen, I shall relate a very remarkable case which occurred to myself at Brussels. A few days after the battle of Waterloo, the weather being then very warm, I was requested by the surgeon of a foreign corps, to visit Major ——, an Officer of the King's German Legion, who, on that memorable occasion, had received a severe wound on the leg. The object of my being called in was to decide on the question of amputation, and to give

* Medicina Nautica, vol. iii. p. 469.

† According to Mr Bell, "When they wanted to steal out, and get drunk, they had two general methods, the wet and the dry; the wet, when they went through the ditch, and the dry, when they burrowed through the sand, and so got under the palisade. In the Yarmouth Hospital sentries were placed, one to guard the holes, and another to guard the ditch; however, he had the most difficult duty who watched the ditch, for nothing of them but their heads were above the mud, and unless he heard them puddling and snuffling, he had no chance of preventing the enterprise."—*Vide* Note to p. 116.

assistance, in case the operation was determined upon. On entering the apartment, at an early hour in the forenoon, I was startled at the appearances which presented themselves, and predicted at once what would be the consequence. The patient was apparently about fifty years of age, of a very plethoric habit, and, without doubt, a *bon vivant*. He was propped up in an arm-chair, wrapped in sheets; his leg, supported by pillows, extended on a stool; and on a table, which stood close at hand, were wine, spirits, and tobacco, in which he had been freely indulging. On examination, I found that the gastrocnemii muscles of one leg had been carried away by the splinter of a shell; the whole limb was in the highest state of inflammation; the system was violently excited; the wound had already become gangrenous, with the peculiar smell which is characteristic of contagious gangrene; and the pain was quite insupportable. I gave it as my opinion that no operation should be thought of, in the state of the wound at that time. I advised that the patient should be largely bled, and some cooling aperient medicine administered; that cold lotions be applied to the wound, and to the whole limb. Stimuli of all kinds to be prohibited, and the most strict antiphlogistic regimen to be put in force, and continued until the fever and inflammation should abate. On my objecting to the use of such powerful stimulants as I saw before me, the effects of which were but too evident from the state of the wound, the Major gave me to understand,

that, with respect to regimen, he would be his own physician, and that my opinion was only requested as far as regarded the operation. My remonstrances I saw were useless, nor was the advice which I gave more approved of by the surgeon, who appeared to be a most determined Brunonian. I accordingly took my leave, with a promise, however, to return, whenever my services should again be required. I heard no more of this patient until some days after, when I met the surgeon who had been in attendance, and who told me that the Major was dead,—that he insisted upon the operation being performed, which was accordingly done; and that the same stimulating regimen had been continued to the last. He died from the violence of the fever, surviving the operation little more than twenty-four hours.

6. *Motion, or Mechanical Irritation.*

This is a much more frequent cause of Hospital Gangrene than has been imagined; for if we admit, that, under particular circumstances, any great irritation may induce the disease, then we cannot doubt, that motion must be one of the chief exciting causes of this affection.

Recollecting what I have myself seen in the Peninsula, which was for so many years the theatre of the greatest military operations, I am convinced that, in transporting the wounded from the field, or from one hospital station to another, when at any considerable distance, more cases of Hospital Gan-

grene appeared upon the road, than in any other situation. In support of this opinion, I shall mention only one or two of the more remarkable instances which came under my own observation.

In the beginning of August 1809, a few days after the severe battle of Talavera, when so many of our wounded fell into the hands of the enemy, the slighter cases only effected their escape, some on foot, others on mules or cars. Few or none of these men had been in hospital after the battle, but had been lodged in convents and private houses, and although the wounds of all were in a most promising state when they began their flight, they had not been many days on the road before evident signs of the disease became manifest. Many, I have no doubt, must have died on the journey, and when the survivors reached Elvas, which was the nearest station on the Frontiers of Portugal, distant about 40 leagues,—the disease continued, and raged with unexampled violence. These cases I saw at Talavera, and some days after on the road, when the gangrene had appeared. In the Autumn of 1813, when I was stationed at Bilboa, a party of wounded arrived from Vittoria, distant only 12 leagues, whose wounds were in a healthy state when they commenced their route, and in whom the gangrene appeared for the first time in the journey thither. Some of them were among the worst examples, that is to say, the most severe, of the disease I ever saw; and the same fact is related by Dr Hennen in his Principles of Military Surgery, p. 214.

7. *Specific Contagion.*

When the disease is once produced, although the same causes continuing to operate may be sufficient to keep it alive, it appears probable that a contagion is generated, and that the disease may be propagated, in this way, to a certain extent at least, even although the causes, by which it was originally produced, should have ceased to act. But I confess, that I impute much less to this than to the continued operation of the original or other irritating causes. At Bilboa we had a strong instance in proof of this opinion. Although all the means which are usually employed for the extinction of contagion were had recourse to, such as fumigations of nitric and muriatic acid gases, ventilation, separation, nothing appeared to have the least effect in moderating the violence of the diease, till the antiphlogistic regimen was established.

However, that the disease is contagious, and even infectious, I think cannot be doubted. This is admitted by most of those who have written on the subject; but how to account for its origin has always been considered a complete mystery. Under what circumstances contagion is generated we shall perhaps never be able satisfactorily to explain; or how a disease which in general has no such property, should occasionally become contagious, instances of which may be seen in erysipelas, or ophthalmia; but it is sufficient for our purpose to be aware of the

fact. This property, however, of generating contagion in its progress, is not peculiar to Hospital Gangrene alone; and it seems to me, that, among certain diseases, which have been thought to owe their origin to a morbid poison, as for instance the Egyptian Ophthalmia, there is in some respects a very considerable analogy to that now under consideration.

This disease, like Hospital Gangrene, has always appeared to me to originate in certain irritating causes, the influence of which is much favoured by the climate. Like it, Egyptian Ophthalmia is found to prevail with greatest virulence in the same seasons, that is during very hot weather; when once produced, it acquires, in like manner, the property of extending itself by contagion, and also by infection; and, lastly, it is found to yield to the same kind of treatment, the antiphlogistic *.

We know that irritating causes, which, acting in a slighter degree, produce only inflammation, increased secretion, and ulceration, will, when carried to excess, occasion sloughing; and this will be found to be the case in specific as well as in simple sores; and we find that all those already enumerated, to which, perhaps, may be added the stimulating influence of mercury, are the most frequent

* May not the same analogy be extended to Syphilis? The recent doctrines which have been advanced, seem, in some measure, to confirm this; and may perhaps help to account for the origin of that disease.

sources of phagedæna in syphilitic sores. Heat, within certain limits, appears to be a most powerful agent, both as a direct stimulus, and as favouring the production of contagion; hence the great virulence of some diseases in warm, and their comparative mildness in cold, or temperate climates.

Now, if it can be made out, that any of the causes, singly, which have been mentioned, may produce Hospital Gangrene, what must we expect, when all, or the greater part, of these causes, are in operation at once? and this is not an imaginary case, but one which, I conceive, occurs very frequently. We have only to observe the movement of a party of wounded on their route, to be convinced of this.

After reading the valuable work of Delpech on this subject, one cannot but be surprised that the effects of local or mechanical irritation should have been entirely overlooked by him; and particularly when he acknowledges, that the wounded had been obliged to travel great distances, and that some of them were between two and three months on the road before they reached the hospital at Montpellier, exposed, as they no doubt must have been, to every cause which could have any effect in bringing on the disease; but contagion, dejection of spirits, want of proper food, and other debilitating causes, seem to be all that the distinguished Professor has taken into account as having any effect in the production of it.

In speaking of the causes of gangrenous phagedæna, Mr Blackadder says, " he has understood, though he cannot certify to its correctness, that the

disease has occurred during the conveyance of the wounded from one hospital station to another, the weather being very hot, and the distance considerable," (p. 46.) And my friend Dr Hilson, now practising at Jedburgh, who had many opportunities of witnessing this affection, speaks distinctly upon this particular, in a very excellent thesis published here in 1818.

If the view now given of the causes of Hospital Gangrene should be found to be correct, it will explain some points in the history of this affection, which have hitherto been considered mysterious; and it will shew that the ordinary means which have been employed for the prevention of this disease, however proper they may be in hospitals for the general health of the patients, such as ventilation, separation, fumigation, or even the entire breaking up of an establishment where Hospital Gangrene prevails, as has been proposed, will be of little avail, so long as the true causes of the disease are overlooked.

For the prevention of Hospital Gangrene in a recent wound, it appears to me, that the great object to be held in view, is to avoid all sources of irritation, and by all the means in our power to keep down inflammation. From the moment of receiving the injury, a moderately antiphlogistic regimen should be prescribed; the wound should be kept cool; and the discharges from it removed by careful ablution: no bandages ought to be applied in the first instance to gunshot wounds. With regard to these, the directions of my friend Dr Luscombe are parti-

cularly deserving of attention *; above all, absolute rest, together with the above remedies, should be enjoined.

The sedative effect of cold in repressing inflammation and Hospital Gangrene cannot, I think, be better illustrated, than in the following extract, which I shall take the liberty of making from the work just now quoted, as it corresponds with what I have said on the subject.

Speaking of amputation the Doctor says, " I have been for a long time persuaded that stumps do much better when dressed more lightly than has been the usual custom, by which the parts are kept in a state of increased temperature by numerous bandages, caps, &c.; and I have of late formed a decided opinion in favour of the direct application of cold to stumps, and other wounds occasioned by surgical operations.

" I was first led to entertain this opinion by a valuable communication I had with the Surgeon-General of Ireland, who acquainted me in conversation that he had ascertained from surgeons who were present at the battle of Eylau, that the wounded were exposed after that action to intense cold, so much so, that many of them were frozen to the ground by their blood; but that it was remarked, that Hospital Gangrene, which was at that time very prevalent, attacked none of those who had been thus exposed to the cold; but that, on the contrary, all their wounds did extremely well."—Page 140.

* Vide Luscombe on the Health of Soldiers, p. 132.

In all wounds, but particularly those of the trunk and lower extremities, rest is of the utmost consequence. Nothing excites inflammation sooner than motion. I shall never forget the appalling spectacles I beheld in the unfortunate men who effected their escape from Talavera; though the wounds of many of them were but slight, and, no doubt, would have soon got well had they remained at rest, and on the antiphlogistic regimen; yet, after a few days, in consequence of the motion, and other irritating causes to which they were subjected, they were to be seen in all stages of the disease, from the state of incipient inflammation, to that of gangrene, and even sphacelus, and loathsome from the quantity of maggots with which they were infested; and, in those men who arrived at Bilboa from Vittoria, many of them were in an equally bad state; whole limbs were to be seen, almost entirely deprived of vitality, nearly dropping off, and a prey also to vermin, which seemed actually to be devouring them.

As a contrast to this, and to shew the effect of rest, when followed up by the antiphlogistic regimen and other sanative measures, I may mention that, after the battle of Waterloo, a very great proportion of the wounded were sent to the hospitals in Brussels, which, being in the immediate vicinity of the field, they reached without much difficulty or exertion. The consequence was, that, among the many hundreds who were treated there, scarcely any cases of this disease appeared. The very few that existed, and which I had an opportunity of seeing,

were in men who had been concealed by the Belgians, entertained in their houses, and from an excess of hospitality on their part, had been treated by them most sumptuously. These cases were highly inflammatory, and yielded to venesection, and the antiphlogistic regimen.

The disease was said to be more frequent at Antwerp, and this is just what might have been expectted; the distance from the field of Waterloo being so much greater.

The practical deduction from all this, I conceive, is, that hospitals should be established as near the scene of action as circumstances will permit; and that wounded men should never be moved, without some very urgent reason.

Having proceeded thus far, I may now advert to a question, which at first sight appears very simple, which has been long agitated, but does not seem to be yet settled; Whether the local or constitutional symptoms of Hospital Gangrene occur first in the order of succession? From the account which has just been given, it will be seen, that the local symptoms were always the first; but to decide the question, I suspect we must look to the causes.

If the disease originates in foul air, or febrile infection, which seems to be the case most frequently in civil hospitals; it is very possible that the constitutional symptoms may often precede the local, or appear at the same time; but in army practice, where other causes are more frequent, as local

or mechanical irritation, intemperance, and such like, it is reasonable to expect, that the local must precede the general affection; and this, I think, must be admitted.

It is by such an explanation only, I conceive, that the discordant opinions of authors on this point can be reconciled.

The prognosis in this disease, as in most others, must depend on circumstances.

If the patient is young and healthy, of temperate habits, and the accompanying fever inflammatory, even although the affection should be pretty severe, the prognosis, I think, may be favourable; but, on the contrary, if the patient is old, addicted to intemperance, his health bad, and particularly, if the gangrene should be complicated with fractures of the bones, or a scorbutic diathesis be present, with a fever evidently typhoid, it must be very unfavourable.

In laying down rules for the treatment of this complaint, we must be guided entirely by the symptoms. If the constitution is much affected, general remedies will be required; if, on the contrary, the affection appears to be entirely local, the cure may be trusted to topical applications; but, in many cases, both the one and the other will be found to be necessary. It is of the utmost consequence, also, to attend to the type of the accompanying fever, and to ascertain whether the gangrene is simple, or complicated with any other disease, such as scurvy, or bilious fever, in which case its character

will be modified, and the corresponding treatment must also be different.

I mean to confine myself chiefly to the simple form of the disease, and to such as I have most commonly met with myself.

The treatment, then, may be divided into general and local.

When Hospital Gangrene occurs in a recent wound, and in young healthy men, or in men of the middle period of life, who are most frequently the subjects of it, the accompanying fever is almost always inflammatory. I have seen but few exceptions to this. Indeed it is not easy to conceive how so many should have adopted the contrary opinion.

Professor Delpech, in his preface, endeavours to show, that the French soldiers, from their great sufferings, and constant defeats, became dejected, and that the fever in them was always of the low kind. This accords with his theory of the disease. The French, however, are not remarkable for dejection of spirits, and have always appeared to me to bear up under adversity with wonderful fortitude. At the same time it must be admitted (probably owing to their more temperate manner of living), that they are less liable to violent inflammatory diseases than the natives of this country, at least as far as accords with my own observation.

But whatever might have been the case in the French army, it was very different in the British. Constantly elated with success, they had gone on, under their great leader, for a series of years, from

one brilliant action to another, each succeeding one surpassing the preceding, till at last they terminated their very extraordinary career, by perhaps the most splendid achievement of modern times. They may be said to have been in a state both of constant bodily and mental excitement. In such cases, I say, the fever is almost always inflammatory, and will require bloodletting; but it must be proportioned to the degree or violence of the inflammation, and the age and strength of the patient.

No precise rule can be laid down regarding the quantity to be taken; but in severe cases I have had occasion to take one, two, three, or even four pounds of blood before the inflammatory symptoms were subdued. In men, however, of a less robust constitution, who may have lingered long in hospital, or suffered much from ill health, we must act with the greatest caution. Bloodletting in such, is either altogether inadmissible, or should be used very sparingly. The same may be said of those who are the subjects of Hospital Gangrene in civil hospitals. They are for the most part poor people, worn out with age, or whose constitutions have been broken by poverty and hard labour; in such the disease assumes a different character, and will require a corresponding treatment. As an auxiliary to general bloodletting, Dr Trotter has proposed the local detraction, by cupping and scarifying; and though I have not employed this myself, I can see no real objection to its use. The danger of the punctures becoming gangrenous, appears to me not to be very

great. The same objection has been made to general bloodletting; but though I have bled many in this disease, I never saw a single instance of gangrene supervening to the operation.

Dr Thomson, in his Lectures on Inflammation, p. 494, remarks, that the effects of spontaneous hemorrhagies in this disease, have either not been accurately observed, or at least not fully recorded, and he conceives that they might be a guide of great importance in practice. To this I beg leave to say, that, as far as my observation goes, in the early or inflammatory stage of Hospital Gangrene, spontaneous hæmorrhage seldom occurs, and it might then, if not too profuse, be very beneficial. But in the later or more advanced stages of the disease, I have always considered it a very alarming, dangerous, and most frequently a fatal symptom, denoting that great destruction had already been done, and that the gangrene was still making progress. Many of our patients at Bilboa were carried off in that way. My sentiments respecting this are very different from those of Dr Hennen. He says, "But what more than all convinced us of a change of type, and pressed on our consideration the propriety of bloodletting, was, that spontaneous hæmorrhagies, which formerly sunk the patient's strength, were now attended with obvious relief."—Military Surgery, p. 223.

Those who trust chiefly to local remedies in this disease, and who disregard the constitutional symptoms, as being of secondary importance, and those

also who consider the accompanying fever to be always of a typhoid type, object strongly to the use of the lancet, and say that they have sometimes found it do incredible mischief. To this I answer, that if bloodletting is used indiscriminately in this disease, there can be no doubt but that it will often disappoint the practitioner, and even be productive of mischief. This I can myself bear witness to; for at Bilboa, after bloodletting had been acknowledged to be of the greatest benefit in those cases to which it was really applicable, I had sometimes the mortification to see that remedy brought into discredit, by being used in cases where it was evident, beforehand, that it must have been injurious; and this will always be the case, where due regard is not paid to the circumstances under which any particular remedy is prescribed.

It has already been said, that, in that form of Hospital Gangrene named Phagedæna, very great destruction of parts may sometimes take place, without the constitution being much affected by it. Now, if bloodletting is used in such a case, or even in the advanced stage of the true inflammatory gangrene, when disorganisation has taken place, and the system is sinking under the consequent debility, the vital powers being nearly exhausted, the result must be obvious; but when it is used with caution, and in cases where it is really applicable, it will be found, I doubt not, to be a most valuable remedy.

Emetics have been highly extolled by many in this disease, as Pouteau and others. I have cer-

tainly often seen them used, and sometimes, as I think, with advantage; but as a general remedy, I consider them much inferior to cathartics. The cases to which they are chiefly applicable, are those where the stomach is loaded, and where the fever appears to be of a bilious character. This was the case in not a few which I saw at Bilboa; the gangrene being complicated with a fever of that kind, and sometimes supervening to it. Emetics in nauseating doses, were often tried in such instances, and were considered useful, both by their operation as evacuants, and by the nausea which they excited, lowering the action of the vascular system. In the same cases, antimonials and saline diaphoretics will be found very useful. But whatever may have been the opinion with regard to emetics, by the consent of all, cathartics are considered quite indispensable.

Cathartics appear to be the remedies, next to bloodletting, the best calculated for lessening arterial action in inflammatory diseases, and the use of them was indicated in cases where that remedy was inadmissible, or at least not so much required. These cases were of a doubtful nature, where general inflammatory action existed to a certain degree, but where, from the long confinement of the patient, or his previous state of ill health, venesection could not with safety be employed, or where the fever was evidently typhoid. Among the poor in civil hospitals, purgative medicines will be found, in this disease, I suspect, unless in very extraordinary

cases, to be the most useful, indeed the safest evacuants.

Bark, which was formerly so celebrated as a specific in the cure of gangrene, is, in this disease, in the commencement at least, entirely useless. Indeed it is not surprising that this should be the case. Bark is acknowledged to be a powerful tonic, and if I am right in considering hospital gangrene to be an acute inflammatory affection, then it is just what might be expected, that, if not injurious, it must at least be ineffectual. But, in the more advanced stages, when the inflammation has abated, it may be given as a useful remedy, either alone, or in conjunction with the mineral acids.

The cold affusion has been thought to be deserving of attention in this disease; but it does not seem to have been ever put to the test. If we were sure of obtaining the sedative effects of the remedy only, I should be inclined to think very favourably of it; but generally, after the cold affusion, a reaction of the system takes place, which I should be afraid might rather aggravate a local inflammation, or at least render the propriety of employing it a matter of doubt; but as I have never tried that remedy in hospital gangrene, I offer this only as conjecture.

To sponging of the surface of the body with tepid water, there can be no such objection, and from its cooling and soothing effects, I should be inclined to expect the most agreeable results.

The violent pain which always exists in the com-

mencement of this disease, seems to call for the use of opium; but as long as the fever and inflammation continue, it will tend only, both by its direct stimulating properties, and by deranging the functions of the stomach and chylopoietic viscera, to aggravate the symptoms. In the more advanced stages, however, when the inflammatory symptoms have subsided, should the patient complain of restlessness, it may be allowed, and then I have no doubt but that it will be found beneficial.

Camphor in large doses has been recommended by Pouteau in this disease. It certainly has very considerable anodyne effects, and perhaps may be used where opium would be improper; but I have no idea of its possessing any specific powers in Hospital Gangrene, and it appears to me, to be applicable chiefly in the low state of the disease, which sometimes succeeds to great vascular action, or where the fever is evidently typhoid. In such cases I have occasionally used it, and I think with good effect.

The use of wine, as is observed by Dr Thomson, in the early stage of hospital gangrene, is liable to still stronger objections than opium, for it adds to the violence of the fever, without having, like opium, a tendency to soothe or diminish the local pain *. At Bilboa I saw much mischief done by an injudicious use of wine; every symptom was aggravated by it, and the gangrene assumed a character of malignancy unexampled I verily believe in the history of this affection, and which, under other cir-

* Lectures on Inflammation, p. 495.

cumstances, it never could have acquired. Had the same treatment been persisted in, it is impossible to say what might have been the result, or to what extent the mortality might have reached. It is my firm belief, that, of the numerous inmates of a very large hospital, the Cordeleria, in which were usually from 600 to 800 men, besides those in the four other hospitals at the same station, where Hospital Gangrene prevailed, very few would have escaped. Fortunately, however, the antiphlogistic regimen was at last established, and in a short time after, the gangrene ceased to be formidable.

But although the use of wine and other stimulants, in the early stage of Hospital Gangrene, while there is great vascular action, as well as much local inflammation, cannot be too highly reprobated, yet there are states of this disease in which it will be found not only not injurious, but very beneficial; such, for example, as the advanced stages of Hospital Gangrene, which occur in poor old infirm people, or where the patients have lingered long in hospitals, and their health has been broken by previous disease, or where the fever is evidently from the first of a typhoid character.

The diet, in the first instance, should be very light, consisting chiefly of farinaceous matter; indeeed I ought rather to say, that an almost total abstinence should be enjoined; but when the febrile symptoms abate, it may be made more nourishing. The drinks should be of the weakest kind, such as tea, water gruel, and lemonade. Ripe fruits, such as oranges, may be freely used; and from the

first, the regimen altogether ought to be strictly antiphlogistic.

Local Treatment.

There are few diseases in which a greater variety of topical applications has been applied, and to enumerate them all would be useless. Those, however, of any efficacy may be comprised under three classes, viz. Sedatives, Escharotics, and Stimulants.

When the inflammation continues violent, cold applications, such as water alone, rendered colder artificially, and solutions of sugar of lead, are what I should prefer. Whatever objections there might be to the cold affusion as a general remedy, nothing appears better calculated to subdue inflammation in the local affection, and consequently to allay pain, than the continued application of cold; besides, in very warm weather, it is much more agreeable to the feelings of the patient than any thing hot. To obtain all the advantage from the sedative effect of cold, cloths dipped in the liquid should be applied to the part, and kept constantly moist. I have already mentioned an instance of the good effect of cold in the prevention of Hospital Gangrene, and I have no doubt that if applied steadily in cases to which it is adapted, it will be found a most valuable remedy.

Poultices of all kinds, the common emollient, as also the fermenting, carrot, turnip, and charcoal, being always applied warm, have appeared to me

in general to aggravate the pain, nor can we be surprised at it, when we consider what a powerful stimulant caloric is. Poultices, though applied cold, soon acquire the temperature of the body; they are, therefore, not the best applications in this complaint, and are objectionable also on account of their weight.

When the inflammation abates, the sloughs separate, healthy pus is secreted, and florid granulations spring up: when this is the case, the wound should be dressed simply with dry lint, over which a pledget of emollient ointment ought to be applied, and the whole supported by a good compress and roller. Should the sloughs continue to adhere after the inflammation has abated, some stimulating application, such as a mixture of resinous ointment, and oil of turpentine, known by the name of warm dressing, may be made to the wound, or an ointment composed of unguent. resinosum and oxyd. hydrarg. rubrum, in the proportion of ℥i of the latter to ʒi of the former. On such occasions I have also found the diluted nitric or muriatic acids, or the citric and acetic acids, good applications: in the same cases a solution of argentum nitratum will be found very useful. It is in this stage of the inflammatory gangrene, that warm fomentations and poultices may occasionally be employed with advantage, and that the stronger escharotics, such as the concentrated mineral acids, caustic alkalis, arsenical solution, or the actual cautery, may be used most successfully; but it is not improbable, that escharotics, applied at

a very early period, when the morbid action is just commencing, may sometimes, particularly in old wounds, arrest at once the progress of the disease. A more generous diet may now be allowed, and even a small quantity of wine. But although the patient has arrived at the stage of convalescence, and may be considered as safe, I can affirm, from extensive experience on this point, that if he be guilty of any excess, more especially in drinking, of using exercise, of not attending to the proper dressing of the wound, or neglecting the state of the digestive organs, he is almost certain of suffering a relapse, when the same train of symptoms will be renewed, and the danger of the patient will be infinitely greater, and exactly in proportion to the state of debility to which he is reduced.

Those who are entrusted with the charge of patients in this state, cannot be too attentive to the proper dressing of their wounds. The new granulations continue long very weak, and extremely liable to fall into disease; and the danger of this will be in proportion to the extent of the renewed surface. Nothing favours this diseased action more than inattention to the cleanliness of the wound, and the want of due support from proper bandaging. When the discharge is long confined, it becomes acrid, and even poisonous, and from this cause, more than any other, I conceive, that that form of the disease named Phagedæna, most frequently arises. If the discharge continue very abundant, the dressings should be frequently renewed, and some as-

tringent lotion, such as a weak solution of acetas plumbi or sulphas zinci used at each dressing; after which powder of peruvian bark may be applied to the wound as an absorbent. In this case also, it may be taken internally, with very good effect. Should phagedæna supervene, which may be known by the appearance of a small dark spot or ulceration, as already described, escharotics should immediately be applied.

This form of the disease, in the first instance, is purely local, and we are almost sure of putting a stop to its progress, by local remedies alone. Those which I have been chiefly in the habit of using are, argentum nitratum and oxyd. hydrarg. rubr.; but the undiluted sulphuric, nitric, and muriatic acids, and the caustic alkalis, have also been often employed with the same intention.

The oxygenated muriatic acid was made use of by Dr Rollo, in that form of the disease which prevailed in the Artillery Hospital at Woolwich, with great success; and lately I find that the nitric acid has been employed at St Bartholomew's Hospital in London, by Mr Welbank, in some cases of syphilitic phagedæna, with the very best effect *.

At Bilboa I used the oxyd. hydr. rubr. very extensively, because, after many trials, I found it was the only escharotic that could be applied, without causing much pain, and that it answered the purpose as effectually as any other. A thick eschar is

* Vide Medico-Chirurgical Transactions, vol. xi. p. 361. *et seq.*

very soon formed, which is easily removed at the next dressing.

An incipient phagedæna may be often removed by one application of the precipitate, but if the ulceration has made much progress, or has penetrated deep into the soft parts, several applications may be necessary, as the eschar only penetrates to a certain depth. In the same cases the solution of arsenic may be employed as recommended by Mr Blackadder in Phagedæna gangrænosa, and practised by him with so much success at Passages, or the actual cautery, as used by Pouteau, Delpech, Boyer and others. Mr Blackadder is of opinion, that Hospital Gangrene, under any form, may be speedily and certainly cured by the arsenical solution.

At the time when this disease raged with so much violence at Bilboa, I had not heard of that remedy; and when I was made acquainted with it, the malady had abated so much, and was so manageable by the means then in use, that it was not thought necessary to have recourse to any other, and since that time I have had no opportunity of putting it to the test. That it is a valuable remedy in certain states of the disease, there cannot, I think, be a doubt; but that it will succeed in all, and without the assistance of general remedies, remains I conceive yet to be proved. Whether for example, it would have been applicable to the cases at Bilboa, attended as they were with such excessive inflammation, and originating in the causes which I have endeavoured to point out; or whether it would answer in cases of Hospital Gangrene, breaking out

amputation, died of it on the first or second day after the operation *.

Several cases of this disease, somewhat different, occurred to myself, in the Jesuits Hospital, which stands in the high part of the town of Brussels. The patients were all wounded in the knee-joint, and amputation was not performed till three weeks from the time of the injury, and just when they were beginning to grow hectic. These patients all went on well for eight or ten days after the operation, the hectic symptoms were entirely removed, and the wounds in some of them were nearly healed; but at the end of that time they were seized with fever. A violent rigor was soon followed by heat, and perspiration; in a few hours more, after another rigor, the wounds burst open, the bone protruded to the extent of several inches, and the whole surface of the stump fell into mortification. The rigors continued at short intervals, and in little more than thirty-six hours from the accession of the fever they expired.

Having before met with such cases, I was aware of the danger, but I could do nothing to avert the fatal termination. Under such perplexing circumstances, it appeared to me most advisable, after prescribing an emetic, and cathartic, to support the strength of the patients as long as possible. With this view, bark was ordered, with wine and other cordials, and the stumps were dressed with a powder composed of myrrh, bark, and camphor, which

* Military Surgery, p. 239.

I have sometimes applied with advantage to mortified parts: but nothing was of any avail; they all sunk in the short space of time already mentioned.

It has been said, that, in Hospital Gangrene, when all other means fail, amputation may be performed with success, and even at a time when the gangrene is extending.

There is one form of Hospital Gangrene, which appears to be entirely local, at least in the commencement; and I have sometimes seen very great destruction done by it, without the constitution being much affected, viz. the phagedenic form of the disease; in which I have no doubt but that the operation may be performed, and without any risk of the disease returning, or affecting the stump; but in the other form of the disease, which has been named Contagious Gangrene, in which there is always inflammation to a greater or less degree with fever, I consider such practice to be extremely dangerous, and contrary to all the rules which have ever been laid down on this subject.

The operation, in my opinion, should never be thought of, until the fever and inflammation abate, and then, in all probability, the progress of the gangrene will be found to be stopped.

The following are three tabular returns of the Cordeleria Hospital, for the months of October, November, and December 1813, which I signed as senior Medical Officer, when the charge of that establishment for the time devolved upon me.

They will give a pretty good idea of the extent to which the gangrene prevailed, and of the compa-

rative efficacy of the different modes of treatment that were employed.

The Hospitals at Bilboa were opened in July 1813, after the Battle of Vittoria; and from that time to October following, the monthly loss at the Cordeleria alone had never been below 80, and it was then only for the first time that the antiphlogistic treatment was introduced.

Tabular View of the Monthly return of the Cordeleria Hospital, from 21st of September to 20th October 1813 *inclusive, before the antiphlogistic treatment was established.*

Diseases.	Remained last Return.	Since admitted.	Total.	Discharged.	Died.	Proportion of Deaths to diseases treated.	Remaining.
Vulnus, ...	872	422	1294	384	83	1 to 15	827
Total, ...	872	422	1294	384	83	1 to 15	827

Tabular View of the Monthly Return of the Cordeleria Hospital, from 21st of October to 20th November 1813 *inclusive, when the antiphlogistic treatment was partially established.*

Diseases.	Remained last Return.	Since admitted.	Total.	Discharged*.	Died.	Proportion of Deaths to diseases treated.	Remaining.
Vulnus, ...	827	30	857	213	25	1 to 34	619
Total, ...	827	30	857	213	25	1 to 34	619

* Of this number, 59 affected with gangrene were transferred to another hospital.

Tabular View of the Monthly Return of the Cordeleria Hospital, from 21st of November to 20th December 1813 *inclusive, when the antiphlogistic treatment was fully established.*

Diseases.	Remained last Return.	Since admitted.	Total.	Discharged.	Died*.	Proportion of Deaths to diseases treated.	Remaining.
Vulnus, ...	619	172	791	67	6	1 to 131	718
Syphilis, ...	...	5	5	...	...	.....	5
Total †,.....	619	177	796	67	6	1 to 131	723

* The deaths which occurred this month were rather from exhaustion and hectic fever, than from gangrene.

† These returns are not so complete as could have been wished, inasmuch as they do not state the number of cases of gangrene which prevailed at any one time. Were I, however, to hazard an opinion upon this point, I should perhaps not be far wrong in estimating the numbers who were affected with this disease from first to last, and in a greater or less degree, to be two-thirds or three-fourths of all the patients admitted; for at one period the whole Hospital was literally overrun with it.

Dr Hennen says, "Every sore in the house assumed a malignant character, and the deaths increased in nearly a threefold proportion," p. 214.; but it was truly gratifying to see how soon the malignant character of the disease was changed on the introduction of the antiphlogistic treatment; the symptoms became more mild, and the deaths decreased almost immediately.

In the month of November, I considered the disposition to gangrene to be in a great measure corrected. However, a few cases still remained, mild indeed, compared with those which

I have thus endeavoured to give a concise view, very imperfect it must be admitted, of Hospital Gangrene, such as I have met with in military practice; an affection which, even in civil life, is at times sufficiently formidable; but which, on many occasions, has been of the most serious consequences to our Fleets and Armies.

Having had opportunities of witnessing the disease, such as I believe have fallen to the lot of but few, I have thought proper to lay before the Society all the information I have acquired on this subject, as well from observation as from books, in the hope of its being useful at some future period to those who may hereafter be employed as I myself have been.

The subject, indeed, might be much extended, but I am not aware that I could add any thing of importance to what is now submitted; and though in this disease, which appears under different forms, depending also on so many different causes, much

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formerly existed; and these, the Deputy Inspector Dr Charles Forbes, who superintended at the station, in his anxiety to clear the hospital of this disease, thought proper to remove to a house appropriated for the reception of gangrenous cases, a measure which was perhaps unnecessary.

I left Bilboa early in January following, for France; so that I am unable to bring the returns down to a later period. I have, however, been informed, that the gangrene ceased entirely soon afterwards, and never again appeared at that station.

must still be left to the judgment of the practitioner, yet there are sufficient marks, I think, to guide us in the treatment of it, so that we need seldom commit any very dangerous mistake.

From the inquiries, then, into this subject, which have of late been made by so many individuals, it is perhaps not unreasonable to expect that considerable good must arise; that the sufferings of the defenders of our country shall in time to come be much alleviated; that the great loss which has so often happened to the naval and military service of the State, shall be lessened; and that, in short, some benefit shall be conferred on society.

REMARKABLE CASE

OF

CRURAL HERNIA.

By George Ballingall, M. D., F. R. S. E.,
Surgeon-Extraordinary to the King, and Regius Professor of Military Surgery in the University of Edinburgh.

On the 14th of March last, I was requested to visit Mrs Hay, a patient of Mr Young's, labouring under obstruction of the bowels; and who had previously been twice the subject of strangulated hernia. The first attack of this disease she had sustained six or seven and-twenty years ago; and it was stated to have then terminated in ulceration at the groin, and the formation of an artificial anus, through which the fæces were discharged for some time. The second attack took place, under Mr Young's observation, about sixteen years ago, and, after considerable difficulty, he succeeded in reducing the tumour by the taxis, without operation.

On examining the groin, where she complained of pain and tenderness upon pressure, an irregular cicatrix, like that of a scrofulous ulcer, presented itself, and a small puffy tumour was observed under

the crural arch, in the usual seat of femoral hernia. This tumour could be reduced with the utmost facility, and the finger could be made to follow it up under Poupart's ligament, the aperture being uncommonly free and pervious. The tumour could be reproduced by coughing; it apparently contained a fluid, and was repeatedly protruded by the patient's efforts, and again returned, with ease, by Dr Abercrombie, Mr Young, and myself, going up generally with a slight gurgling noise. The patient's bowels had been completely obstructed for upwards of two days; she had vomited repeatedly, and complained of pain and tenderness over the whole surface of the abdomen, although these last-mentioned symptoms had been considerably alleviated, previous to my seeing her, by bloodletting, blistering, and the other measures adopted by Mr Young and Dr Abercrombie.

Being satisfied, from an examination of the parts, that no stricture existed in the crural arch, we were led to conjecture that a contraction of the calibre of the intestine had probably taken place, in consequence of the previous sphacelus, or ulceration of the gut, six-and-twenty years before; and, under these circumstances, I suggested the possibility of saving the patient's life, by making an incision over the site of the tumour in the groin; and, should the bowel be found obstructed or adherent in the neighbourhood of the crural arch, perforating it, to give vent to the fæces, thus forming again an artificial anus. The symptoms were not,

however, at this time, thought sufficiently urgent, to justify an operation, the utility or success of which depended so much upon contingencies, which could not be foreseen, and twenty-four hours more were employed in attempts to relieve the bowels by the exhibition of purgatives, particularly the croton oil, and by the administration of turpentine injections. These not proving successful, the other gentlemen in consultation with me became desirous that an attempt should be made to save the patient's life by operation. I therefore made an incision in the usual form through the integuments, and opened a hernial sac, from which a small quantity of serous fluid was discharged; towards the outer or iliac side of this sac a small portion of intestine was found lying adherent to the integuments and to the sac, but having no appearance of strangulation, nor in any degree compressed or strictured by the crural arch; this portion of gut was slightly wounded in dissecting back the integuments, and was afterwards opened, freely, as seen in the preparation on the table; the finger was introduced through the aperture, and carried both upwards and downwards, but no feculent matter was reached, nor was any discharged during the patient's life. She gradually sunk after the operation, and survived only about eighteen hours.

On dissection, the aperture was found to be in the lower part of the ileum, which was somewhat contracted both above and below the orifice, and in the upper part of the canal a considerable quantity of

liquid fæces was found, which had begun to pass through the opening in the gut during the dissection. No obstacle, indeed, appeared to exist to the free passage of the fæces through the aperture which I had made; but the upper part of the canal seemed to have become paralysed previous to the operation, to have lost the power of propulsion, or, perhaps, to have taken on an inverted action, as indicated by the stercoraceous vomiting which latterly took place.

It was my intention to have submitted to the society, at some length, the observations which have suggested themselves to me, in reflecting upon the foregoing case, but, at present, other avocations prevent me from doing so; and I shall only observe, that this, and many other cases, press strongly upon my mind the justice and importance of a remark made by Janson, the chief surgeon of the Hôtel Dieu at Lyons: "Nous dirons à ce sujet, qu'on ne peut jamais préciser au juste ce qu'on rencontrera dans une tumeur herniaire." This uncertainty as to the contents of every hernial tumour, appears to me to justify and to encourage an early resort to operation, wherever any vestige or remains of hernia exist, in combination with obstinate obstruction of the bowels; and had the operation which was performed in Mrs Hay's case been done at an earlier peri[illegible], there is, I think, much reason to believe that her li[illegible] would have been prolonged.

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OBSERVATIONS

ON THE

NATURAL OR SPONTANEOUS CURE

OF

SYPHILIS.

By John Wilson, M. D. Hull.

From the time of the celebrated John Hunter, the various symptoms of Syphilis have been so well described, and the appropriate treatment of each so accurately pointed out, by many distinguished authors, that there seemed to be no room left either for improvement or farther discussion.

The practice of the medical officers of the army, has, indeed, within the last few years, introduced a new æra in the history of this disease; but as the inquiries they have so meritoriously instituted, and so candidly related, may not convince every mind of the propriety of their practice, and of the deductions which naturally result from its success, I shall offer a few observations on the causes most likely to impede its adoption, with some facts and inferences which seem to confirm the principles on which their practice is founded: for, notwithstand-

ing the apparent advancement in our knowledge of this disease, there is perhaps no other which still produces more discordant opinions among practitioners, or whose effects are contemplated with more anxiety by the patient.

It has always appeared to me, that much of this uncertainty may be attributed to the division of Lues Venerea by some of the later writers, into Syphilis and Pseudo-Syphilis. I shall therefore begin with inquiring into the propriety of this division.

The primary symptoms of Syphilis are well known to vary much in their nature and extent, from a simple abrasion of the skin, to the true syphilitic chancre, or phagedænic ulcer, as described by authors; they have often been observed to heal spontaneously, or under the application of topical remedies only, without being succeeded by secondary symptoms; and the mildness or severity of the latter has no apparent relation to that of the former; for secondary symptoms of various kinds and degrees, sometimes supervene even in cases where no primary symptom had existed, or in which it had been so slight as to pass unobserved. The secondary symptoms have also long been known to disappear spontaneously sometimes, and many well authenticated cases of their removal, by remedies of little or no acknowledged virtue in the present day, are on record: I allude to a period preceding the late cures by the medical officers of the army, by simple topical applications, and a rigid observance

of the antiphlogistic regimen. The nitric acid, for example, about twenty-five years ago, had a higher reputation than any other remedy ever acquired except mercury; and this was founded on as indisputable evidence as medical facts will admit of. Even the success of many inert quack remedies, well known to contain no mercury, may be fairly admitted as a confirmation of the tendency which this disease has towards a natural cure.

The belief, however, of the undeviating progress of the syphilitic virus, and the hopelessness of combating it by any other remedy but mercury, were so firmly established, that these favourable terminations were either regarded with indifference, or the disease was deemed to have been not truly syphilitic.

With those extensively engaged in the treatment of lues venerea, the great difference in the facility with which it is cured, in different cases, could not fail to arrest the attention; for although the disease, in some instances, completely answers the worst descriptions given of it by authors, and even mercury itself fails to remove it; yet all will agree, that the great majority of cases yield to this remedy, and that it often happens, that bad cases are cured by apparently a very inadequate portion of it.

These discrepancies no doubt suggested the opinion, that there were several kinds of the syphilitic virus; but the grounds of distinction among these seem to me unsatisfactory.

Mr Abernethy, to whom medical science is so much indebted, defines syphilis by observing, that "the constitutional symptoms of syphilis are generally progressive, and never disappear unless medicine be employed;" and, "that they are generally relieved under an adequate effect of mercury on the constitution."

If the symptoms of true syphilis could be distinguished from those of the spurious disease or diseases, by any well defined difference in their external character, and not solely as they appear generally to have been, by their constant progression and resistance to every other treatment but the mercurial one, the necessity of such a division would be obvious, even at the present time, when beth of these last statements are opposed by the non-mercurial cures by the Army Medical Officers, and other facts in the history of the disease to be immediately adduced.

Mr Abernethy himself, however, who has adopted the distinction of syphilis and pseudo-syphilis, explicitly acknowledges, that it is impossible to fix upon any diagnostic symptom which can enable us to mark a difference. It is therefore obvious, that the distinction has been formed solely for the purpose of separating diseases that may be cured without mercury, from such as cannot; and that the nature of the affection cannot be ascertained, until that remedy be employed, and its effects observed.

In treating of pseudo-syphilis, this author remarks, that "the fictitious disease in appearance so

exactly resembles syphilis, that no observation, however acute, seems to be capable of deciding on its nature."

Mr Abernethy, indeed, attempts to distinguish the true from the spurious disease; but it is evident that the only ground on which he relies, is the effect produced by mercury, and later authors might be quoted to the same purpose. If this remedy was innocuous, such a mode of forming a diagnosis might be safely admitted; but as it not unfrequently has deleterious effects on the constitution, such practice must often be attended with unnecessary suffering to the patient, and much perplexity to the practitioner.

As we thus see an author of distinguished eminence, and of extensive experience in venereal diseases, acknowledging the impossibility of distinguishing between syphilis and pseudo-syphilis, by any other mode than the future contingency of a mercurial course, the salutary termination of which is by no means certain, and which, on all hands, must be allowed to be a severe test for the patient; it may be presumed that this division is neither founded in nature, nor accompanied by any practical advantage.

There are other diseases arising from specific contagions, in which as great a diversity of symptoms occurs as in the cases called Syphilis and Pseudo-syphilis, yet it is known that they arise from the same virus, however it may vary in its effects; thus, there is as much difference between a

mild case of small-pox or scarlatina, and a severe one, as can occur in syphilis; and the effects, local and constitutional, of the animal poison absorbed in dissections, are at least equally various, although of much shorter duration; and these examples are exactly in point in another respect, inasmuch as their mildness or severity do not depend on the kind of virus or contagion applied, but on some peculiarity of constitution, the nature of which, it must be confessed, often cannot be discovered, although it is sometimes sufficiently apparent.

The phlogistic diathesis, and especially that state of the system induced by a frequent and liberal use of intoxicating liquors, certainly contributes both to a greater liability to the contraction of the venereal poison, and to render its effects more obstinate and severe; and, accordingly, in naval practice, where the source of infection can be more easily traced, and the habits of individuals more exactly ascertained, than in most other situations, I have often had occasion to contrast the effects of the same virus, in different subjects, as very generally confirming this. I have also repeatedly ascertained the same woman to have infected several individuals in quick succession, in some of whom, the primary and secondary symptoms of syphilis followed; while others had gonorrhœa with swelled testes; and the severity of the disease very exactly corresponding to the habits of the patients.

The scrophulous diathesis also, is generally supposed to have an influence in many diseases, and

although sometimes obscure and of difficult cognisance, its existence may often be ascertained by the well known external characters; and all the writers on venereal diseases concur in stating their obstinacy when it is present; indeed this might *à priori* be expected, as these diseases have considerable analogy in some respects to each other. In the few fatal terminations of syphilis which I have wit nessed, this diathesis was well marked: but it was doubtful in those cases, whether the event was more to be attributed to the disease, than to the mercury with which the patients had been largely and repeatedly imbued.

The pernicious effect of mercury, described by some authors, in superinducing a peculiar irritation of the system, sometimes attended by the erythismus mercurialis, during the continuance of which it possesses no power to arrest the progress of the disease, but, on the contrary, is said to convert the existing symptoms into other equally dangerous affections, not to be distinguished from the original ones, is another source of painful uncertainty. It chiefly occurs in those cases where repeated courses of mercury have been used, and of course the first step in the cure is the omission of the remedy.

An examination of the historical evidence, on which the American origin of lues venerea has been founded, would exceed the limits I have assigned to these observations; but that the disease became very prevalent in Europe, and much attracted the attention of medical and other writers, soon after

the arrival of the companions of Columbus from Hispaniola in 1493, and was then, for the first time, imputed to infection from impure coitus; seem to me to be the amount of all the evidence of its importation from that quarter.

The belief of the foreign origin of the disease, has had much influence on the opinions entertained of its nature, and particularly as occasioning the effects of ordinary causes on the genital organs to be overlooked. It cannot be denied that these organs are as susceptible of disease as other parts of the body, and that inflammatory action should produce in them a *virus sui generis*, and capable of producing disease when applied to another, is perfectly analogous to what is known of some other morbid poisons of spontaneous origin.

The vaginal discharges of women, in whom no venereal poison can be suspected, are said to be sometimes so acrid as to cause ulceration of the parts with which they come in contact; and that this matter applied to the glans or prepuce of a healthy person, should inflame or ulcerate these parts, or be absorbed, and induce a peculiar train of symptoms, is quite consistent with what is known of morbid poisons in general.

When, however, an author of Mr Abernethy's acknowledged accuracy and experience asserts, that he has known "both gonorrhœa and ulcers occasioned by connection with persons who had no syphilitic disease," and that "gonorrhœa arising under the same circumstances, is so common as to

need no exemplification;" it seems almost superfluous to adduce other proofs of the disease arising spontaneously. In treating of pseudo-syphilis, he farther observes, "it may be right, however, to remark, that there are cases which would induce the belief, that ulcerated sore throats, eruptions and nodes on the bones, similar to those described, may occur from a general disturbance of the constitution, without the absorption of any infectious matter;" and, that "some species of animal matter, which are not the products of disease, are, nevertheless, capable of exciting it in others."

If, indeed, the structure and functions of the organs, with the circumstances so often preceding and accompanying the origin of venereal affections are duly considered, it becomes rather a matter of wonder, that diseases of the genitals do not occur more frequently, and terminate in ulceration, independently of the application of any morbid secretion; and if the latter, however formed, is applied, the nature and condition of the parts, under these circumstances, are well adapted for its absorption.

In support of the opinion that venereal diseases are indigenous in every country, I may be permitted to observe, that I have witnessed gonorrhœa in a native of New Holland, at a great distance from any British settlement, and in a situation entirely precluding the possibility of his having either directly or indirectly acquired it from

any European or other foreign source; for the population of that country is extremely thin, and each tribe lives so completely isolated, that they often have no knowledge of the language, or even existence, of their nearest neighbours.

A difference of opinion still exists as to the identity of the virus of syphilis and gonorrhœa; but the latter is, I believe, every where of much more frequent occurrence than syphilis.

The history of the disease at the island of Otaheite, where it has undergone a remarkable revolution, disproves, on a large scale, the opinion of the undeviating progress of syphilis, unless opposed by a specific remedy; and also shews, that gonorrhœa may exist in a large community without inducing it.

This island, as is well known, was discovered by Captain Wallis in the year 1767; but, as the natives were hostile, and he remained only for a short time, it is probable that his ship's crew had too little intercourse with them, for ascertaining whether the disease existed in the island at that time; his people, however, did not contract it. It was subsequently visited at different periods, two or three years afterwards, by the celebrated Captain Cook, and the French circumnavigator Bougainville, both of whom found the disease to be very prevalent; but as their relations are confined to a general statement of the fact, it is impossible to decide by what form of it their crews were affected. During a succeeding period of about

thirty years, the island was visited by few ships; all of those, however, whose voyages have been published, report that their crews were infected, and that the disease continued to make great ravages among the natives.

His Majesty's ship Porpoise, of which I was surgeon, visited the island in 1801, and remained for three months. From the accounts in voyages, and the personal reports of some missionaries, who had resided there for several years, there was much reason to fear that our people would suffer from the disease, and, accordingly, precautionary measures were recommended to be adopted by the captain, which were, however, soon found to be unavailing, and were abandoned after the first week of our visit.

The connection of our people with the native women immediately became unlimited, and probably two-thirds of the whole of the young ones, at that time on the island, were at various times on board.

During the first month, none of the crew contracted any venereal disease whatever; and in the remaining part of our stay, only three of them were affected with gonorrhœa.

In a second visit, in the following year, after remaining two months, and one at the neighbouring island Eimeo, thirty of the crew contracted gonorrhœa, but no other form of the venereal disease appeared among them, nor did any secondary symptom supervene. Only one case of

swelled testis appeared, in a person much addicted to inebriety.

It is certain that, in neither of our voyages, did our ship import any venereal disease, as the people submitted to a minute inspection ten days before our arrival; but in the interval between our voyages, a small vessel had arrived, and was wrecked on the island; whose crew, amounting to twenty-one, we found living on shore, and one of whom brought a severe gonorrhœa with him. This sufficiently accounts for the great increase of that infection since our first voyage.

The prevalence of scrofulous tumours and ulcers seemed to me to have misled former reporters respecting the ravages of syphilis; as, at first sight, these appear to be uncommonly frequent, although a minute examination would probably shew that they are not much disproportionate to the numbers affected in Europe; for the scanty dress usually worn by the natives is ill calculated for concealing whatever external diseases they are affected with.

The total exemption of the natives from any other form of the disease, and the opinion at that time entertained by the best writers, of the nature of syphilis and gonorrhœa, the first of which was universally believed incurable by any remedy but mercury, and the last to be only a topical affection, incapable of inducing the constitutional disease, seemed to me to prove, that syphilis had never been introduced into the island, and that

former navigators had met with gonorrhœa only, which (so fluctuating are medical opinions) was in their time deemed capable of inducing all the symptoms of syphilis.

Accordingly, in some observations on this subject, which were published in the Edinburgh Medical and Surgical Journal, I was at some pains to maintain this opinion; but, since that time, having fortunately met with the late Captain Colnet of the Royal Navy, an officer of accurate observation, and very extensive information, who accompanied Cook in two of his voyages, and who decidedly testified, that he had witnessed chancres and buboes, as well as gonorrhœa, in many of their crew at Otaheite, that opinion becomes no longer tenable; and the only admissible conclusion now is, that syphilis, in the space of about thirty years, had disappeared from the island.

It cannot be believed that the crew of the Porpoise could have escaped the infection of syphilis, had it existed in the country, after such unlimited intercourse with the women as has been stated; nor that the latter, who have no regard for chastity, would be restrained from such, on account of their being infected.

After a careful inquiry, in many excursions throughout the island, accompanied by a missionary well acquainted with the language, I was satisfied that the inhabitants had never used any remedies except salt-water and cocoa-nut-milk, occasionally as a purgative, and that the great dimi-

nution of the population which had taken place, was to be ascribed, not to any infection from Europeans, but to a fever of an intermittent or remittent type, and dysentery, which had been long prevalent, and very fatal, and to their own practices, of which I have given some account in the paper alluded to.

The mode of cure so successfully adopted by the medical officers of the Army, by simple external applications, a rigid antiphlogistic regimen, including a complete state of rest in both the primary and secondary stages of syphilis, have been so fully detailed by them, that it is not necessary to repeat them here. The character of these gentlemen, and the publicity of their practice, entitle their reports to the utmost confidence; and it will be principally to their exertions that the profession and the public, will owe the benefits that must ultimately accrue from a pursuit of the inquiry they have so zealously carried on.

Whether the use of mercury may be safely superseded altogether in this disease, will require a large accumulation of experience to determine; in the mean time, where the antiphlogistic treatment can be safely adopted, and effectually followed, there can be no doubt that it will be equally successful in private practice; but as the same rigid observation of rules cannot always be expected, it is probable that the general results will be less favourable than in hospitals, or in military and naval practice.

CASE

IN WHICH A

POLYPUS OF GREAT SIZE

WAS REMOVED FROM THE ROOT OF THE TONGUE

BY LIGATURE.

By Richard Huie, M. D. F. S. S. A.

Fellow of the Royal College of Surgeons, and Surgeon to the Royal Public Dispensary, and Vaccine Institution.

In the month of August 1826, I was requested to visit Miss M——, a maiden lady between forty and fifty years of age, who was reported to have an unusual difficulty of speech and deglutition. On inspecting the fauces, a smooth round tumour was seen filling the greater part of the pharynx, and accompanying the motions of the tongue. The portion of the tumour, which was visible, was of the size of a chesnut; but when, by pressing the tongue downwards, a degree of retching was excited, the lower portion came partially into view, and shewed it to be double that size at least.

The smooth rounded form of the tumour conveyed, at first sight, the idea that it was of the encysted kind; but, upon examination with the finger, it was found to be as hard and unyielding as the substance of the tongue itself, and evidently of the na-

ture of polypus. From the wriggling motion of the tumour, when a degree of retching was excited, it was conjectured that the pedicle was comparatively small, and nearer the upper than the lower extremity of the polypus; but by no contrivance was it found possible to bring it into view.

The history of the affection was as follows: Having been exposed to cold and fatigue about twelve months before, Miss M—— was attacked with catarrhal symptoms, attended by some inflammation of the fauces; but her complaints yielded to the usual remedies, and she thought no more of them. Three months after this, however, she was observed by her friends to articulate less distinctly than before, and, about the same time, she began to feel a slight difficulty in swallowing. These symptoms continued to increase, until at length she could swallow nothing but liquids, or bread crumbled down very fine, and suspended in soup or tea. She invariably felt worse in damp weather, and it was then only that she experienced any material difficulty in breathing. A degree of retching was often excited, and occasioned great distress; and the food she attempted to swallow was frequently returned through the nose. She spoke like a person whose tonsils were very much enlarged, a circumstance which had led to the application of various rubefacients and gargles, the true nature of the disease never having been understood.

Having requested the favour of Dr Ballingall, Professor of Military Surgery in this University, to

see this patient along with me, we were of opinion that it was a case to which the ligature alone was applicable; and that although the pedicle of the tumour could not be brought into view, a ligature might, with a little address, be put round it. Accordingly, on the 4th of September, I proceeded to the operation, assisted by Dr Ballingall and Dr Russell. We were provided with a variety of instruments, very few of which, however, we found to be necessary. While Dr Ballingall kept the patient's jaws asunder, by means of a cork introduced between the teeth, I took a long and stout ligature in my left hand, and grasping one end with a pair of common dressing forceps, I carried it backward into the pharynx on the right side of the tumour. Then touching the parts gently with the extremity of the instrument, I produced that degree of retching already alluded to, which, bringing the polypus more completely into view, I succeeded, with even less difficulty than I expected, in throwing the ligature over it. I had purposely abstained from forming any noose upon the ligature, being anxious to ascertain, as far as possible, the size of the pedicle, round which the ligature immediately slipped, and satisfied me by the narrowness of the loop which was formed, that it was in reality very small. A double knot was now tied, and tightened by Dr Ballingall and myself, by means of curved probes forked at the extremity, and the ligature was cut away at the distance of an inch and a half from the pedicle. The latter part of the ope-

ration was a good deal interrupted by the retching induced by the introduction of the instruments; but we had the satisfaction of perceiving, by the altered hue of the tumour, that the strangulation was completely effected.

The patient's bowels having been freely opened by means of a full dose of Sulph. Magnes. on the morning of the operation, it was not considered necessary to prescribe any thing for her, except a laxative enema every night at bed-time, and a little Infus. Rosæ, by way of gargle. She was allowed a little beef-tea at intervals; but she took little of that, or indeed of any thing else during the time of the separation of the tumour, having suffered much from pain in the parts, want of rest, and irritative fever. An anodyne draught was prescribed for her the second night, but having a good deal of courage she declined taking it, saying that she was willing to suffer any thing to get rid of her complaint. Upon pulling gently at the ligature on the fourth day, the tumour came away entire; the patient was freed from suffering; and to this day enjoys excellent health.

The tumour, which is in the Museum of the Royal College of Surgeons, was of an oval form, weighed exactly an ounce, and measured five inches in its long, and four in its short, circumference. It was broadest opposite the insertion of the pedicle, which entered at the distance of an inch from the upper part of the tumour. A longitudinal incision, which has been made into it, displays a firm cartilaginous nu-

cleus, as large as a chestnut, surrounded by a fibro-cartilaginous structure, forming the rest of the tumour.

The case which I have detailed, is in some measure unique; at least, I have not been able to meet with one precisely similar. The situations in which polypus usually occurs, are the nose and the uterus; but it is also occasionally met with in the oesophagus and rectum. From the former situations, the disease may generally be removed, if the patient apply to us in time; from the latter, its complete removal is extremely difficult.

Mr Hunter, and after him Mr Abernethy, are of opinion, that tumours in general, and polypi in particular, have their origin in a coagulum of blood deposited on a particular surface, or in a particular texture, and organized by vessels shooting into it from the surrounding parts. That this may take place in many instances, I have no manner of doubt; but considering the situation in which the tumour in the present case occurred, it is difficult to conceive how any coagulum, however small, would have been permitted to remain on the surface of the tongue until it became organized. Were I to hazard a conjecture on this point, I should say that, during the inflammatory affection of the fauces, the increased action had probably been greatest at one particular point, and had occasioned there a very minute deposition of coagulable lymph immediately under the integuments; that these being raised by this minute quantity of lymph, and the lymph itself be-

coming organized, the little tumour continued to elongate until it became pendulous; and having become pendulous, that it went on increasing in size at the lower part, owing to the less ready return of the blood towards the pedicle; from which cause the pedicle itself received no accession of bulk.

Be that as it may, however, there can be no doubt that polypi vary very much in their structure, according to the parts from which they grow. In the present instance, the tumour, both to the sight and the touch, very much resembled the structure of the tongue. Mr Abernethy says that he has seen polypi growing from the palate, and resembling it in structure; and the loose cartilages occasionally met with in the knee-joint are originally polypi attached to some part of the joint by a slender pedicle, and torn from it by some sudden exertion on the part of the patient.

The most remarkable features in the present case are the size of the tumour compared with the situation in which it was found, and the little obstruction which it offered to the respiration of the patient. It strikingly illustrates the manner in which many parts of the human body accommodate themselves to new growths taking place in their vicinity, so that the existence of these is frequently not detected, until they have become inconvenient simply from their bulk. How often is the surgeon consulted respecting tumours, which his patients assure him have sprung up in a night, while he himself is conscious that they must have been going on for

months, or even years! The sudden introduction into the pharynx of a large and firm body, like that which was removed in the present instance, would, in all probability, have occasioned immediate suffocation; and yet, from the gradual nature of its development and increase, the patient was able to endure its presence for ten months at least.

ON THE

VISCERA

OF THE

COMMON SWORDFISH,

(Xiphias gladius, Lin.)

By Robert E. Grant, M. D., F. R. S. E., F. L. S., M. W. S., Fellow of the Royal College of Physicians of Edinburgh, Professor of Zoology in the London University, &c.

A full-grown male specimen of the common swordfish, more than 7 feet in length, was taken in the Frith of Forth, in September last (1826). It was observed at low water, with its sword sticking in a muddy part of the coast near Alloa, by Mr Slight, one of the assistant engineers under Robert Stevenson, Esq.; and being quite entire, and in a fresh state, it was immediately sent to Edinburgh for the University Museum, where it is now preserved stuffed. It is somewhat remarkable, that although this powerful and gigantic animal has been known from a very remote antiquity to abound in the Mediterranean, and has been long

used as an article of food, both in the Old and the New World, we do not yet possess any account of its anatomy. The following observations on its viscera are taken from the specimen above mentioned, the carcass of which, after the removal of the skin, was kindly presented to me, for dissection, by Professor Jameson. I have given an account of the remarkable structure of the eyes of this animal, which were 3 inches in diameter, in a paper lately read before the Wernerian Society, and published in their Transactions. The dimensions of the entire animal were, from the extreme point of the sword, to a line drawn between the tips of the tail, 7 feet 2 inches; from the point of the lower jaw to the hollow of the tail 4 feet 10 inches; circumference of the neck before the dorsal fin 2 feet 4 inches; length of the sword 2 feet; tail perpendicularly, 18 inches broad.

The swordfish is sometimes found 20 feet in length in the Mediterranean, and I am informed by M. Audubon, that it is frequently harpooned in the Gulf of Mexico, measuring more than 10 feet, exclusive of the sword. The body is covered with a strong smooth skin without any visible scales. Cuvier and some other writers have described this animal as covered with small scales. The dorsal fin is sometimes figured and described as forming a continuous fin along the back. In this specimen the dorsal fin was divided into two portions, placed at a considerable distance from each other, and connected only by an almost imperceptible ridge along the spine. The singular cartilagi-

nous expansion on each side of the tail, projected nearly 3 inches from the surface.

Almost every part of the body was infested with intestinal worms; the muscles covering the skeleton were perforated in every direction and contained them alive, and they abounded in the abdominal viscera, particularly between the coats of the intestinal canal. The bright red coloured *Tristoma coccineum* is said by Cuvier and Fleming to infest the gills of the sword-fish. In a putrid specimen of this animal, more than $8\frac{1}{2}$ feet long, seen by Dr Fleming on the side of the Tay, he found the *Ascaris incurva*, *Tetrarhyncus attenuatus*, and *Bothriocephalus plicatus* of Rudolphi, lodged about the stomach. The internal organs of the specimen from the Forth, exhibited no other diseased appearance than the small ulcerations and cysts produced by these worms. The body was in a very fat condition, and abounded, particularly in the muscular and cellular parts, with a soft oily matter, having very much the appearance and smell of whale oil. The venous system in the internal cavities, was turgid with red blood; and the abundance of red vessels throughout the muscular system, at a great distance from the heart, showed an unusually extensive distribution of the red globules of the blood in this animal. This appearance may have been produced by the struggles of the animal before death, and by the unusual strength of its heart and large arterial trunks. Both cavities of the heart and the great trunk of the branchial artery contained black coagula of blood,

as consistent as those of a quadruped; and the firm adipose substance in many parts of the body, more resembled that of the mammalia than the soft matter we usually find in fishes.

The venæ cavæ formed a distinct fleshy sinus before entering the auricle of the heart. The inner surface of this sinus is deeply marked with strong fleshy columns like those of the auricle, disposed in various directions. As this sinus is contracted at the opening into the auricle, and as the cavæ enter very obliquely into its cavity, it can almost perform the functions of an auricle. The opening from the sinus into the auricle admitted the fore-finger, and was provided, on the auricular side, with two strong tendinous semilunar valves, which completely prevented the return of the blood from the auricle. The free margins of these two valves met in a straight line across the middle of the passage, and their extremities on each side were bound closely together by a very distinct small white tendon. The auricle, when moderately inflated, was more than double the size of the ventricle, and of a quadrangular form. Its parietes were a quarter of an inch thick, covered internally with fleshy columns disposed around its axis, and nowhere membranous, as we frequently find the auricles of fishes. The numerous deep round pits between the fleshy pillars of the auricle, showed a free communication with each other, when inflated by the blowpipe. The passage between the auricle and ventricle admitted the finger, and was likewise provided with semilunar valves. The two thick

white crescentic membranes forming this valve, were beautifully supported on the ventricular side, by numerous thin, radiating tendinous cords. As the ends of these two membranes were not bound closely together by ligament, like those of the auricular valve, a small supplementary valve was seen on each side, which shut up the two angular spaces and completed the entire valve. The ventricle had the form of a triangular pyramid, with a very oblique base. Its apex terminated in the branchial artery, and the auricle opened into its back part near the apex. The ventricle measured four inches from the base to the beginning of the branchial artery, and its parietes were more than half an inch thick. The sides of the ventricle were firm and compact, and the pits between the fleshy pillars were smaller and fewer in number than in the auricle. On the outside of the ventricle there were considerable patches of white firm adipose substance beneath the membranous coat, and many strong twigs of nerves were seen passing loosely from the surface of the ventricle to the auricle. The semilunar valves, which are sometimes placed, as in the skate, so far from the ventricle as the bifurcation of the branchial artery, were here placed at the origin of that vessel from the ventricle, as in the aorta of quadrupeds. The pits on the inside of the ventricle communicated with each other, like those in the auricle. The valves at the origin or pedunclé of the branchial artery consisted of two strong crescentic membranes, bound together at their ex-

tremities by a firm white ligament on each side. To the distance of an inch and a-half beyond this valve, the parietes of the great bronchial vessel were nearly as thick and muscular as those of the ventricle, and had the same fleshy pillars and round pits on its inner surface, as we observe in many of the larger fishes. The vessel had been divided at this distance from the heart, in removing the skin and gills for the preparation of the specimen, so that I could not observe whether additional valves were placed at the bifurcation of the artery, as is sometimes the case. The heart of the swordfish appears stronger and better provided with valves, than almost any other in this class of animals, and is admirably constructed for maintaining an undisturbed circulation of the blood, during the violent efforts it must frequently exert in plunging and extricating its sword.

The sword-fish agrees, in many of its internal characters, with the sturgeon, whose structure has already been examined and described by authors. Like that animal, it has no teeth. There are two rough bony projections at the sides of the fauces. The œsophagus was of great width, muscular, corrugated, and covered with a thick white mucous secretion. Although fishes want salivary glands, we always find an abundant secretion in their mouth and œsophagus. This appears to be partly derived from their capacious stomach, which is always at a very short distance from the mouth. The entrance of the œsophagus into the stomach was much more

contracted than usual, and the sphincter muscle of the cardiac orifice of very great strength. The stomach had the form of a long compressed narrow flask, and was fourteen inches long from the cardiac sphincter to its lower shut extremity. It was four inches broad in the middle, and tapered towards each end. The large coronary arteries, and veins gorged with red blood, passed along the outer margins, and sent branches irregularly to both the flat surfaces. The parietes of the stomach were more than half an inch thick, remarkably muscular, firm, much contracted, and the cavity contained no solid food. The muscular coat a third of an inch thick, and consisting of strong fibres disposed in every direction round the cavity, was connected to the internal villous coat by a soft white fatty substance, apparently of a glandular nature. The honeycomb plicæ of the inner coat were raised about two lines from the surface, and the whole cavity presented a villous appearance. It contained only a viscid white mucous secretion like that found in the œsophagus. The pylorus was so small and contracted as not to admit the fore-finger. It opened on the upper and right side of the long shut sac of the stomach, immediately beneath the cardiac sphincter. The muscular coat at the beginning of the pylorus was very thick, but did not form so regular a sphincter as that of the cardia. The pyloric valve, formed in most fishes by a loose circular fold of the inner coat, was placed at the distance of nearly two inches from the stomach, and completely prevented the return of

food, bile, or the pancreatic fluid from the duodenum into the stomach. The whole intestinal canal, from the pylorus to the anus, measured 5 feet 2 inches. It was only 1 inch in diameter, excepting the lowest 5 inches, which had double the diameter of the rest, and formed a short cylindrical rectum. The first 8 inches of the intestine from the pyloric valve were much thinner and softer in their coats, and presented a smooth glistening internal surface, without any villous appearance. This part was very slightly marked with the honeycomb plicæ, found in the stomach, and in the rest of the small intestines. About 9 or 10 inches from the pylorus, the inner surface of the intestine re-assumed its villous covering, and the villi became gradually longer and closer, to the lower extremity of the rectum. The upper half of the canal made six turns in a zigzag manner on itself, and the lower half made four complete spiral turns before terminating in the short wide rectum or colon. The whole intestine below the duodenum was very muscular, and appeared much contracted. It contained a thick white opaque chyme, which had a flocculent appearance, like the digested muscular parts of fishes. But although the whole digestive canal was carefully laid open, no portion of bone or other hard substance could be found, to indicate the kind of food that had been last taken. Dr Fleming found many remains of the *Loligo sagittata* in the stomach of his specimen. The short wide cæcum, which terminated the intestinal canal, did not com-

municate, like a cloaca, either with the organs of urine or those of generation. The small intestine entered its upper part obliquely, and a projecting fold of the inner villous coat round the entrance formed a complete valve, like that of the colon in higher animals, to prevent the return of matter into the ilium. The rectum is lined with long and close-set villi, and terminates immediately before the anal fin, where it is surrounded with a strong circular sphincter.

Immediately beyond the pyloric valve, the ductus communis choledocus passes in an oblique direction through the coats of the duodenum, and enters beside the great duct of the pancreas. The liver is comparatively small, somewhat triangular, not divided into lobes, convex above, and concave beneath, of a reddish brown colour externally, grey within, and occupies the left side, as in other fishes. The two trunks of the hepatic veins issued from a deep sulcus on the upper margin of the liver, and entered the wide muscular sinus of the vena cava before reaching the heart. The venæ portarum and hepatic ducts occupy the middle of the concave surface, as in man. The weight of the liver was 19 ounces. Its upper margin measured 10 inches; the right 8; and the left 9. Its thickness in the middle was 1 inch and a-half. The gall bladder was large, thin, irregularly pear shaped, curved once on itself, capable of containing 4 ounces of bile, and placed at a considerable distance from the liver. Three hepatic ducts issued separately from the concave

surface of the liver, and entered very obliquely into the cystic duct, about an inch from its termination in the duodenum. From the fundus of the gall-bladder to the termination of its duct in the intestine, measured exactly 14 inches. The oblique entrances of the three hepatic ducts into the cystic, rendered it impossible to press back the bile from the cystic into the hepatic ducts.

The pancreas of this animal was the most remarkable for its size and form I have yet met with. It was the heaviest organ in the abdomen, weighing $25\frac{1}{2}$ ounces; it was $6\frac{1}{2}$ ounces heavier than the whole mass of the liver, which is generally the largest organ in the abdomen of fishes. The form of the pancreas was like that of the human kidney, but more rounded; and its enormous duct issued from the part corresponding to the pelvis of that organ. The length of the organ was 8 inches, the breadth 6 inches, and the thickness $2\frac{1}{2}$ inches. Externally, it was of a bluish white colour, of a firm consistence, and enveloped in a strong fibrous membrane, besides the peritoneal coat. Through the pellucid coats we could perceive, that the whole outer part of the organ was formed of small white shut sacs, nearly a line in diameter. On removing the coverings from the pancreas, the white tubular sacs covering the whole surface, were found to be the shut extremities, of innumerable small appendicula cœca, which united into larger and larger trunks, as they proceeded towards the centre of the organ. These small cœca, and the

trunks formed by their union, were not merely in contact with each other within the enveloping membranes, but were firmly united together into a regular reniform mass, by interposed cellular substance, and the ramifications of bloodvessels and nerves. They had the same glandular structure, and secreted the same milky white fluid, as the analogous detached pyloric cœca we find in most osseous fishes. The numerous trunks or ducts formed by the union of these ramified cœca, became gradually fewer and larger as they approached the hollow margin of the pancreas, next to the curvature of the duodenum. They at length opened into this part of the intestine by one large orifice, an inch and a-half in diameter, without exhibiting any prolonged duct; and this orifice was placed, along with that of the ductus communis choledocus, close to the anal side of the pyloric valve. These ramified tubes were filled to their minutest extremities, with a thick white fluid, very much resembling the chyme which filled the intestine. It is quite obvious, from the wideness and unprotected state of the entrance into these cœca, which was half an inch wider than the duodenum, and without either valve or sphincter, that the food must enter freely into this singular organ, after passing the pyloric valve. I have observed the food to enter freely into the substance of the liver, by similar wide orifices in the stomach of some molluscous animals, as in the Doris argus. The only example hitherto described of a pancreas approaching to that of the swordfish, is that observed

by Monro in the sturgeon, where the cœca likewise form a ramified mass opening by one orifice, and surrounded by a fibrous membrane, which he considers as a muscle destined to compress the pancreas, and force its contents into the duodenum. The glandular appendicula cœca constitute the simplest form of the pancreas met with in animals; and I have elsewhere shewn, that it distinctly occurs in this simple form, so low as the gasteropodous mollusca.

The spleen of the swordfish was not divided like that of the sturgeon, but formed a single oblong mass, of a deep red colour, 3 inches long and 2 broad, placed below the liver, among the small intestines behind the stomach. Monro found seven spleens in the sturgeon, the largest of which was only equal in size to a garden bean, and the other six were as small as peas, although the animal to which they belonged was nearly six feet long. In the swordfish, the great size of this organ corresponds with the very abundant distribution of red blood through the body of this animal.

The air-bag formed a long and entirely shut sac, placed between the kidneys and the testicles, and connected with the fore-part of the bodies of the vertebræ. When moderately inflated, it was 14 inches long and 3 broad, and it tapered regularly, from the middle towards each end. The remarkable red coloured glandular bodies of the air-bag, and the passage of communication between this sac and the stomach, or the œsophagus, which we

frequently find in osseous fishes, were wanting in this animal. This large fusiform sac had no aperture whatever, and contained about 15 ounces of gas *, which was probably secreted by the vessels ramified on the coats. In the sturgeon, the red glandular bodies of the air-bag are likewise wanting, but we find in that animal a large oval aperture, an inch

* A quantity of this gas, collected under water, was carefully analyzed by my friend Dr Turner, Lecturer on Chemistry, &c., who has kindly favoured me with the following account of its properties and chemical composition. M. Brodbelt found the composition of this gas to vary considerably in different specimens of the swordfish, sometimes he observed only carbonic acid, and in others pure oxygen.

"The gas (from the air-bag of the Xiphias gladius) is colourless and inodorous. It extinguishes a burning taper, and is not kindled on the approach of flame. With lime-water it yields a precipitate of the carbonate of lime, indicative of the presence of carbonic acid. It does not form an explosive mixture with oxygen, and therefore does not contain hydrogen, carburetted hydrogen, or carbonic oxide gas. When previously mixed with hydrogen, spongy platinum causes a diminution in volume, owing to the formation of water; and consequently oxygen is present.

"By means of a concentrated solution of pure potash, I find that the carbonic acid amounts to 23 per cent.; and, by the aid of hydrogen and spongy platinum, I have ascertained that the gas contains 6 per cent. of oxygen. The residue has all the properties of nitrogen. It hence appears that 100 measures of the gas, submitted to examination, consist of

Nitrogen, -	71
Oxygen, -	6
Carbonic acid, -	23
	100"

and a-half in diameter, opening from the air-bag into the upper part of the stomach. The inner surface of the air-bag in the swordfish is smooth and glistening, without either the septa or plicæ, which frequently occur in other fishes.

The kidneys were two feet long, as soft, and nearly of the same colour, as a coagulum of venous blood, and were firmly connected with the sides of the vertebræ by the peritoneum, and by cellular substance. On cutting open the long narrow membranous pelvis placed along the mesial side of each kidney, numerous and very large infundibula were seen opening into its cavity. The two ureters which descended from these pelves terminated in a large urinary bladder, lying, as usual, behind the rectum, and capable of containing eight or ten ounces of urine. The bladder was nearly spherical, composed of strong white muscular parietes, with a glistening internal surface, and opened by a round muscular aperture on the back part of the anus. On each side of the anus there was a circular aperture, capable of admitting a goose quill and opening into the cavity of the peritoneum, as described by Willoughby and Monro, in many other fishes. The two testicles were 8 inches long and about $1\frac{1}{2}$ in breadth, and were placed longitudinally between the kidneys and the small intestines. They were of a pale flesh-red colour, slightly lobed on the surface, a little compressed, and tapered from the middle towards each end. They were of a firm and almost homogeneous texture, covered with a very

delicate transparent membrane, and gave out a white milky fluid, when a cut portion of them was pressed between the fingers. Their two vasa deferentia converged and terminated in the urinary passage at the back part of the anus, as in other osseous fishes.

ACCOUNT

OF THE

EPIDEMIC ERYSIPELAS,

WHICH APPEARED IN MONTROSE AND THE NEIGHBOURHOOD IN 1822.

By W. Gibson, Esq. M. D. Surgeon, Montrose.

Communicated by the President.

IN the month of February 1822, I saw at Arbroath, along with Dr Stevenson, several cases of erysipelas, the appearance and history of which convinced me, that the disease, as it then prevailed in Arbroath, was of a contagious nature. In a week or ten days afterwards, I was called to see, at Montrose, a medical gentleman, who had, in consequence of a fall, received a wound of the scalp, in the back part of the head. For some days very little attention had been paid to the wound, and erysipelas supervened, which spread upward from the wound over the whole head and face, and gave rise to fever, coma, and death. On examining the body, there was found a considerable suppuration of the scalp above the wound, extending in a circle of almost six inches in diameter. The purulent matter was not confined in an abscess or sac, but diffused generally in

the substance of the scalp, and the pericranium was completely separated from the skull, over the whole extent of the suppuration. No mark of the disease could be discovered in the encephalon. Instances of the disease became so frequent, and were marked by such peculiar circumstances, as to leave no doubt on the minds of all the medical practitioners, that Erysipelas was now prevailing epidemically in Montrose and the neighbourhood, and it continued so for about four years. The following are some of the circumstances in which it differed from the sporadic erysipelas, as observed in former times. It was much more severe in all the symptoms, and it was more fatal. Of a hundred cases of common erysipelas, which I had seen in former years, not one had proved fatal. In the epidemic Erysipelas the mortality was very great; at a loose conjecture, I would say fifteen per cent. The disease was not so much confined to the head or face, as common erysipelas, but it frequently attacked other parts of the surface of the body. Sometimes the internal fauces were attacked, and if it spread to the trachea, it generally proved fatal. It spread more rapidly and much more extensively. It was followed, in almost every case, by extensive diffuse suppurations in the cellular substance,—particularly when other parts than the head were attacked, and sometimes by sloughing of the parts affected. It frequently supervened on wounds, particularly if they were situated on the head or face, sometimes on ulcers. Occasionally, the disease seemed to be confined to the cellular membrane, as extensive suppurations would

occur with little or no apparent disease of the skin, and even without any redness. I shall mention some cases which struck me with peculiar force, and which may throw some light on the nature of this disease.

On the 6th current, James Craig, a healthy young peasant, was brought to his father's house, in the village of St Cyrus, from his former residence, at the distance of some miles, affected with erysipelas of the face. It was reported that his master had died, a few days before, of a febrile disease. In Craig, the disease became very severe, spread to the chest and abdomen, and was attended by violent fever and delirium. These symptoms were succeeded by very extensive suppuration, extending from the neck to the lower part of the abdomen. At both these points vent was given to the purulent matter, and he ultimately recovered. His father was now attacked in both hands and arms. The disease spread to the neck and face, and he died in a few days. It was only after death that it was discovered that the most extensive suppurations had taken place along the back and loins, from the neck to the sacrum. Four young children in the house were next attacked with febrile symptoms, which continued for eight or ten days, but the symptoms did not seem to differ from those of common continued fever, nor could any mark of erysipelas be observed. The mother, who was much occupied about the diseased, remained healthy.

James Steven, a healthy young man in Montrose,

was attacked with erysipelas in the face. The swelling was, however, much more trifling than usual, so that there appeared little more than a deep blush. In a few days the throat became affected; then the larynx; upon which he was very suddenly cut off. One of his sisters, a married woman, who waited upon him, had an open ulcer on the fore-finger of the right hand, from whitlow. Erysipelas appeared on the edges of the sore, spread rapidly up the arm, over the whole neck and chest, and terminated in a large abscess of the right mamma. No sloughing of the ulcer on the finger took place, such as always occurs in hospital gangrene.

An infant son of a gentleman in Montrose was seized with erysipelas on one foot. The disease spread successively over both legs and arms, and the whole trunk of the body, but it did not reach the face or head. It terminated by abscesses in both ankles and shoulders, which were opened, and ultimately did well. The mother was now affected with erysipelas in the face and scalp. The disease spread over the whole trunk, but did not reach the extremities. It terminated in a small abscess in the neck, and another in one of the eye-lids. The nurse who suckled the child was now attacked with symptoms of pneumonia, and obliged to go home to her father's house at Old Montrose, a distance of four miles. Her father had, some days before her arrival, received a wound of the scalp. In a few days after her arrival erysipelas came on upon his head and face, of which he soon afterwards died.

A sister, living in the same cottage, became affected with severe febrile symptoms, attended with inflammation of the throat, from which she recovered very slowly. Two children in the same house, one five, the other seven years old, were, at this time, cut off by what seemed an attack of croup. The nurse herself had a second attack, apparently of pneumonia, afterwards of cynanche, similar to the sister's disease, and ultimately recovered only after a lapse of several months.

I was, one day last year, suddenly called to see Mr David Wylie of this town, a healthy middle aged man. I found him labouring under great oppression at the precordia, with depressed pulse, and in a few days he died. I was told, that, some days before, he had been seized with rheumatic pain in the right side, which, after the part affected had been several times rubbed with oil of turpentine, had shifted to the left leg; and that on this being rubbed in the same manner, he had that day been seized with the faintness and oppression. After his death, I was asked to see a maid-servant in an adjoining room, who had an attack, as I was told, of pneumonia. I found that there existed a very large collection of purulent matter between the right mamma and neck, which at once led me to suspect that she had had an attack of erysipelas. I then went into the next room, and, on examining Mr Wylie's body, found distinct marks of erysipelas a little below the right arm-pit, and on the left leg. The maid-servant was sent to her mother's. The

mother, in about ten days after her daughter's arrival, was seized with violent febrile symptoms, with dyspnœa and oppression, and died after a few days illness. Another maid-servant, who removed the bed-clothes after Mr Wylie's death, complained of heat and uneasiness in her hands and arms; on inspection, they appeared red and slightly swelled, but the disease did not proceed farther than this blush of the surface of the skin, although there were distinct febrile symptoms present.

In 1824, Christian Taylor, from the parish of St Cyrus, was admitted into the infirmary here, with abscess of the hand, and caries of the bones of one finger. Some days after her admission, the patients in the two beds next to her were seized with erysipelas, and, on inquiry being made, it was ascertained that the suppuration in Taylor's hand had followed an attack of erysipelas, which had been prevalent in that parish. The patients were all removed from that ward, and it was well cleaned, white-washed, and fumigated. Yet, when patients were placed in that ward, the disease again made its appearance, and it was found necessary to remove the whole patients from our little infirmary, and to take every precaution, before the contagion was eradicated.

In March last, William Keith of this town received a blow on the forehead with a large file, which penetrated to the skull. Some weeks afterwards, when the wound was nearly healed, erysipelas of the face and head supervened, which occa-

sioned his death. On dissection, a considerable effusion of serum was found on the surface, and in the ventricles, of the brain; and, in many places of the surface of the brain, the arachnoid coat was raised up in small clear vesicles from the pia mater. This is the last case of the disease I have met with.

Although contagious erysipelas has prevailed for four years in this town and neighbourhood, yet it has not attacked a great number of the people, many concurring causes being necessary, as in the case of other morbid poisons, to give it effect. With these we are not yet sufficiently acquainted, to speak with precision respecting them. During these four years, out of a population of 20,000, I do not think more than 400 were affected.

MONTROSE,
Nov. 2. 1826.

CASE

OF A

CONGENITAL DISEASE,

OR

MALFORMATION OF THE THIGH-BONE;

ILLUSTRATING THE PATHOLOGY OF INTERSTITIAL ABSORPTION OF THE *CERVIX FEMORIS*.

By Robert Knox, M. D. F. R. S. E., Lecturer on Anatomy, Fellow of the Royal College of Surgeons, and Conservator of their Museums.

I was requested, about a month ago, to be present at an examination of the body of a child, who had died under the care of Mr Moir, of a lingering disease. The child was about two years of age. The complaints which proved fatal were rather of an obscure nature, but were suspected, by all the medical attendants, to be connected with the chest. Dissection proved this; for, on inspecting the body, it was found that an enormous quantity of a scrofulous looking purulent matter had collected in the cavity of the right pleura; the membrane shewed signs of having been extensively inflamed, and the collection of pus had influenced, in the usual way, the

corresponding lung, by forcing it to occupy a much smaller space; and, in a word, to render it comparatively useless to the individual. I found it difficult to ascertain exactly how long the child had been ailing; the parents affirming that the child had been ill for about five or six weeks only; but the medical gentlemen in attendance assured me, as indeed was proved on further inquiry, that the child had been in a sickly state for more than six months.

I have said above, that the purulent matter collected in the cavity of the pleura had a scrofulous appearance; but, as I should be sorry to mislead any one in estimating the importance of the alteration in the form of the femur I am about to describe, candour requires of me to state, that there existed no external marks of scrofula in this child; such as enlarged head, swollen glands, or cicatrices of old abscesses, or rickety bones: neither did we find, on dissection, any disease whatever in the abdominal cavity; such as enlarged mesenteric glands, tubercles of the liver, &c. There was, indeed, a slightly tubercular appearance in the corresponding lung, or that which had suffered by the pressure of the collection of purulent fluid; but, with this exception, there existed no other visible marks of a scrofulous predisposition. Lastly, it ought perhaps to be mentioned, that one of the medical gentlemen attending the child considered it as certain that there existed a tendency to scrofula in the family.

Previous to the examination of the body, which led to the preceding remarks, my attention was at-

tracted to a striking difference which existed in the right lower extremity, when compared with the left. It was much weaker generally; and, more particularly, the muscles of the thigh were weaker and softer than those of the left lower extremity. The whole limb seemed about three-fourths of an inch shorter than the other, and the toes were slightly turned out. When cut into, the hip-joint was perfectly sound in all its parts; the acetabulum was not changed in form, inflamed, or in any way affected: the head of the femur was also in a perfectly natural state; but the neck of the bone might be said to have disappeared. The trochanters appeared much longer than usual, and more particularly the larger trochanter; the head of the bone, in consequence of the disappearance of the neck, had become, to use the language of botanists, *sessile*; it had descended to a level with the trochanter, and indeed bore the strongest miniature resemblance to those specimens of diseased femur, which, from the days of Trioen, to the present time, have been imposed on the profession as specimens of bony union following fracture of the *cervix femoris*. I need not, I presume, remind the Society of the natural elevation of the head of the femur, in a child, above the level of the trochanter, and the direct influence which the depression of the head of the bone to the level of the trochanters, must necessarily have over the total length of the extremity.

I regret that it is not in my power to exhibit the specimen to the Society; but, being familiar with

pathological specimens, in consequence of their so frequent occurrence in my dissecting-rooms, and from my position in the college as conservator of the museums, and having, at the same time, no favourite theory or prejudice to support, it will not readily be supposed that any part of this description has been distorted or exaggerated. My own experience informs me, that a case of this sort must be extremely rare; and I have the testimony further of my friend Mr Benjamin Bell, who, though he has himself paid the greatest attention to this peculiar alteration happening to the trochanters and cervix femoris, and is author of a work on the subject of interstitial absorption of the neck of the femur, a monograph, in my humble opinion, of great merit, has never met with the disease at so early a period of life.

The Continental pathologists, and more particularly Mr Beclard, seem to regard these alterations, which attack not only the trochanters and neck, but also sometimes the head of the bone (as may be seen in all museums), as arising from the continual pressure and weight of the body. The above case offers an insurmountable objection to this theory; and, besides, I have in my possession the vertebræ of a young person which have undergone this alteration, and in whom all the other bones of the body were perfectly sound.

ON THE

SUDDEN SPONTANEOUS OBSTRUCTION OF THE CANALS

OF THE

LARGER ARTERIES OF THE BODY;

WITH SOME OBSERVATIONS ON THE PROCESS EMPLOYED BY NATURE TO PREVENT OR ARREST HÆMORRHAGE FROM LACERATED ARTERIES.

By John W. Turner, Professor of Surgery to the Royal College of Surgeons, and Consulting Surgeon to the Edinburgh New Town Dispensary.

It has sometimes been observed, that the pulse has suddenly and permanently disappeared in one part of the body, while it has continued distinct in the other parts; and, in some cases of this kind, on examination after death, it has been found, that an obliteration had taken place of a portion of the tube of the artery in which the pulse could not be felt during life. This morbid affection of the arteries appears, till very lately, to have escaped the

notice of pathologists, and no full or accurate description of it has as yet been published. I have therefore been induced to attempt to give a connected account of a considerable number of cases of it, which have either fallen under my own observation, or have come to my knowledge as observed by others.

The first instance with which I am acquainted, where this sudden and spontaneous obstruction of the arteries was observed, and its true nature suspected, was in a patient under the care of Dr Thomson and myself in the year 1814. An account of this case was, soon after its occurrence, communicated to Mr Hodgson, who published it in the Appendix to his valuable Treatise on the Diseases of the Arteries and Veins. But as it appears to me interesting, from its having been the first of the series, and as it was minutely and carefully observed, I conceive it will not be out of place to repeat some details of it here.

Case I.—A gentleman, about 40 years of age, of a full habit, was exposed to cold on the 1st of January 1814. This produced a feeling of chilliness, and occasional alternate cold and hot fits, which continued to increase in frequency and severity. On the 9th, when he first sought professional assistance, he was affected with smart fever, accompanied by bilious symptoms, a slight cough, and feeling of oppression on the chest. Under the use of laxative medicines, spare diet, and confinement to bed,

these symptoms speedily abated, and on the 15th he considered himself so well as to get up and leave his bed-room. In consequence of this, he suffered next day a return of his complaints, to which were added a diffused pain over the right side of the chest, with oppressed breathing. He was now bled at the arm, and aperient medicines and diaphoretics were given. The blood was not buffy: the cough abated; and the pain left the breast, but extended down the side, and two days afterwards attacked the right groin near the insertion of the pectineus muscle, shooting down the limb, and particularly affecting the calf of the leg, and sole of the foot. This pain continued violent for two days, and alternated between the groin and the calf of the leg. There was considerable heat in the pained part of the thigh, and the femoral artery was observed to throb very violently in the groin. The fever continued, but was mild; the feelings were easy; the pulse 96; and the surface generally covered in the course of the day with a free perspiration. In about a week a solution of the fever seemed to be taking place, when, after fatigue, he was again attacked by rigors, accompanied with feeling of great depression, and an affection like globus hystericus. This was followed by feverish heat, and an increase in the frequency of the pulse, which ranged from 94 to 112. These symptoms continued without amendment, and the patient became much emaciated and debilitated. On the 11th of February, the pulse suddenly fell to 70, but without relief of the other symptoms.

It was weak, and beat twice rapidly in succession after every fifth stroke. With the advice of Dr Hamilton, who had been consulted, port-wine was given, instead of claret which he had previously been using to a moderate extent; and, after taking three glasses, the pulse became regular, and more firm. On the 13th he had three copious evacuations from the bowels, of fluid consistence and black colour, not unlike dissolved blood. This was accompanied by very alarming symptoms of sinking. He was affected by a severe rigor, followed by profuse sweating. The pulse became quick, and very feeble. He complained of extreme languor. The countenance was pale and fallen, and he had lost the recollection of past events. Wine was freely administered; and, on the 15th, he was better, being collected, and less languid. By the 20th the evacuation from the bowels, which had continued black, had become of a lighter colour; and from this time he gradually continued to improve in strength, and to take his food with appetite.

It is to be remarked, that, during this last attack, about the 7th of February, a slightly painful and hard circumscribed swelling was observed on the inner side of the tibia, at the upper part of the calf of the right leg. This swelling disappeared spontaneously in a few days. In the earlier stages of the ailments, the pulsations in the arteries were occasionally observed to be remarkably sudden and throbbing.

On the morning of the 5th of March, after the

patient had been for several days so well as to be able to leave his bed-room, and when he appeared gradually convalescent, on raising himself in bed, by resting on the palms of his hands, with his arms stretched behind him, he experienced a sensation as if something had given way at the elbow joint of the right arm. This was immediately followed by numbness of the hand and fore-arm, and a sensation of circumscribed tightness over the fore part of the elbow joint. The hand soon became cold, and, on trying to feel his pulse at the wrist, he was surprised and alarmed to discover that it had entirely ceased. On examination during the day, no pulsation could be detected at the wrist, nor in any part of the fore-arm below the tendinous expansion of the biceps muscle. Above this spot, the pulsation in the humeral artery was strong, and opposite the elbow joint it appeared stronger than in the other arm, but entirely confined to the site of the artery. No tumour or swelling could be perceived; but on feeling the course of the artery between the finger and thumb, immediately above the part where the pulsation ceased, its tube seemed to be rather larger and harder than in the other arm. He complained of pain, of a pricking kind, at the bend of the arm, somewhat increased by pressure. The numbness, paleness, and coldness of the hand continued, and he had slight tingling feeling in the fore-arm, but the powers of sensation and of motion were not impaired. In the evening the pain had

increased, and extended along the fore-arm; and the pulsation opposite the elbow-joint had diminished in strength, being now not so strong as in the other arm. A very feeble pulsation could be observed in the radial artery at the wrist, and the hand, which was covered with flannel, had become warmer. On compressing the fore-arm, the veins in the back of the hand and wrist were seen to fill slowly.

On the 6th, the parts surrounding the artery at the elbow were less lax, and a slight hardness was felt along the inner edge of the tendon of the biceps muscle. The pain was more severe on pressure and motion, and extended, in the course of the artery, one inch above the point where the pulsation ceased, and two inches downwards on the radial side of the fore-arm. The numbness had considerably abated, and the pulse could be felt at the wrist, very feeble but sufficiently distinct to permit its being counted. The fulness and hardness in the course of the artery, and the pain on pressure, rather increased till next day, when they began to abate, and then very gradually disappeared. The numbness of the hand also went off. The pulsation at the wrist did not increase in strength from the second day of the affection.

While we were anxiously watching the progress of these changes in the arm, the patient was attacked by a similar morbid affection in the right leg. On the 9th March, five days after the stoppage of the pulse in the arm, about midnight, in moving his right

leg without any great exertion, he experienced suddenly a sensation of numbness and weight, extending from the ham downwards. On examination, in half an hour after, no pulsation could be felt in any of the arteries of the foot, or in the ham. The pulsation of the femoral artery was very strong, and could be felt all along the thigh to the part where the vessel perforates the triceps muscle, but no farther. The foot was cold: no pain was excited by pressure on any part of the limb, but he complained of occasional cramp-like pains in the calf of the leg. The next day pain was excited by pressure on the course of the artery in the lower part of the thigh, where the pulse ceased, and in the ham. Above this the femoral artery beat very strongly, the pulsations in the groin communicating the sensation to the fingers of a pulsating tumour; and a strong pulsation was felt in the abdomen, along the course of the aorta. The pain, occasioned by pressure and motion of the limb, continued to increase in the lower part of the thigh for three days, after which it gradually abated.

The morning after the attack, the foot was pale and cold; and below the ankle the integuments were entirely devoid of sensation, when pressed, pinched, or tickled, and the muscles of the foot seemed to have lost the power of contraction. The next day several mottled purple patches appeared on the instep and fore part of the ankle, which gradually extended over the whole foot, till the surface by the fifth day

had become entirely livid. At first, minute branches of veins, full of blood, were intermixed with the purple efflorescence: they could be emptied by pressure, and slowly filled again on the compression being removed. As the discoloration advanced, the foot swelled slightly, and became œdematous, and appeared to acquire an increase of temperature. Soon after the attack, he complained of severe burning pain in the foot, and a feeling as if it were crushed, which continued till near the death of the patient. About the ninth day, the soft parts above the ankle began to swell, and to be hot and painful on pressure: the swelling gradually increased, and extended till it reached the upper part of the calf of the leg. The integuments above the ankle began to be discoloured on the ninth day, and the discoloration increased till the lividity reached the calf of the leg, and at last rapidly extended nearly to the knee. The soft parts adjoining the discoloured skin were swollen, and very painful on pressure; but no redness appeared, nor any inflammatory line between the dead and living parts. The parts discoloured were completely insensible.

On the seventh day after the attack, several tense globular vesications and bullæ appeared on the foot, some filled with reddish, and others with pellucid serum. They increased in number, and extended above the ankle to the calf of the leg.

When the patient suffered the attack in the leg, he was already much reduced by his previous illness.

He afterwards became still weaker, his pulse increased in number, and he had frequent copious sweatings, and occasionally a tendency to faint. After the swelling began to reach the leg, his constitution became more affected; the pulse reached 120. He had great languor, and profuse perspirations. His breathing became laborious, with aggravated paroxysms of dyspnœa, and attacks of cough, with expectoration of mucus tinged of a red colour. His throat also became aphthous. These symptoms continued, the pulse becoming more feeble, till the 27th March, when, while sitting up in bed, he suddenly fell back, and, after two or three deep inspirations, expired, eighteen days after the pulse ceased in the leg, and twenty-two after the arm was first affected.

The state of the body was minutely examined after death, in doing which, we were assisted by the late Dr Gordon.

The brachial artery was exposed, and traced to the fore part of the elbow, where it was imbedded in a hardened mass, composed of the surrounding cellular membrane, veins and nerves, which adhered firmly to each other, and to the artery, Plate I. Fig. 1, *a*, *a*. When the last was slit open, it was found to be impervious immediately before dividing into the radial and ulnar branches. At this part its caliber was much contracted, and filled with a cylindrical clot of firm lymph, which extended about a quarter of an inch upwards, from the division of the vessel, and adhered firmly to its internal surface (*b*). The

orifice of a large branch was situated immediately above the termination of this clot of lymph.

The radial artery was obliterated for nearly an inch and a quarter. Its canal was much contracted, and filled with lymph adhering firmly to its internal surface, and terminating in a delicate conical process, about two lines in length, which projected downwards into the tube of the artery (*c*). The obliteration extended only to the commencement of the ulnar artery; the internal coat of which terminated in a distinct edge, which proceeded about half an inch downwards, in an oblique direction from the obliterated part (*d*). The coats of the arteries in the obliterated space were hard, thickened, of a whiter colour than natural, and adhered inseparably to the surrounding parts. Above and below, they appeared sound in every respect.

On cutting into the inferior extremity, a considerable effusion of a clear serous fluid was found in the thigh, and upper part of the leg, and the muscles were rather pale. But lower down, where the skin was discoloured, the muscles were of a dark colour, very flaccid, and easily torn; and, in the course of the incisions, copious coagula of black blood were brought into view. On tracing the vessels, considerable hardness and adhesions were found, where the femoral artery perforates the tendon of the triceps muscle, and in the upper part of the ham. When the artery was slit open, an ovoid sac was found in its course, immediately after the vessel passed through the tendon of the triceps, Fig. 2. *a*.

This sac contained a hard solid substance, resembling lymph, of the size and shape of a nutmeg (*b*). The surface of this coagulum was covered with a thick, greyish coloured fluid, resembling pus. The coagulum was unconnected with the containing sac, except at its upper extremity, where it adhered very firmly. Immediately above this sac, the tube of the artery was obliterated to the extent of half an inch. Its coats were much thickened, and its parietes were in contact, and adhered to each other (*c*). From the obliterated portion, a large conical coagulum extended up the vessel for three inches, (*d*). To the distance of more than an inch and a half below the sac, the coats of the artery were thickened, and its canal was filled with a very firm coagulum of lymph, which adhered strongly to its internal surface, and sent a strong conical process, half an inch in length downwards (*e*). The sac appeared to consist of several layers. The inner of these arose from the coats of the artery, but no appearance of the internal coat of the artery, or of circular fibres, could be observed. At the attachment of the sac to the inferior portion of the artery, the internal coats of the vessel terminated in a ragged margin (*f*). The inner layer of the sac appeared to be composed of the dilated external coat of the artery, and the other layers to be formed by the surrounding cellular substance.

Beyond the lower obliteration, the popliteal artery was pervious, and empty, for the extent of about two inches (*g*); it appeared sound in every respect,

except in there being a small crucial fissure, or laceration of the internal coats, opposite to the origin of a large branch, which arose from this portion of the vessel (*h*). Below this part, the artery was again obliterated, to the extent of an inch and a-half, by lymph effused into its cavity, and adhering to its parietes, though not so firmly as in the obliterated portions already described (*i*). This closed portion terminated in a thin sac, which would contain a small bean, filled with a fluid resembling pus, and similar to that found in the sac of the femoral artery (*k*). The sac was easily torn; its internal surface was ragged, and of a white colour, and it was connected with the artery both at its upper and lower part. The origin of the anterior tibial artery was attached to the middle of its parietes (*l*), and the coats of this vessel were so much thickened, that its canal was nearly obliterated. Below the sac the posterior tibial artery was filled with lymph for nearly two inches (*m*); the lymph adhered to the vessel, and terminated in a conical clot, where the peroneal artery is given off (*n*). The internal coat of both the inferior and superior portions of the artery were observed to terminate abruptly at the commencement of the sac. The plugs of lymph found in the four obliterated portions of the artery, terminated opposite to the origin of branches from its trunk. The peroneal artery was in a natural state for a short space, but its coats suddenly became hard and thickened, and its canal almost closed. Beyond this point, its internal surface was of a dark

purple colour, and the coats of the vessel had lost their elasticity, marking the place to which the gangrene had extended (*o*). The femoral vein adhered to the femoral artery, opposite to the dilated part of the latter. The coats of the vein in this situation were thickened, and its diameter somewhat diminished. Below this part, its cavity was, in several places, filled with coagula of blood. The femoral artery above the first closure was healthy, as were also portions of the aorta which were examined. The brain was sound, having only a slight serous effusion on its surface. The abdomen was examined, but no diseased appearances were discovered. There was an effusion of about ten ounces of bloody serum in the left side of the thorax, and about one-half that quantity of pellucid serum in the right side. The lungs were healthy; the heart was of large dimensions, but its structure was natural.

I have been induced to detail the above case at considerable length, as it appears to me interesting, not only on account of the singular affection of the trunks of the arteries, but also as illustrating the effects of the sudden cessation of the circulation in the extreme parts of the body. Thus it was observed, that the obstruction to the supply of blood to the leg produced important effects on the functions of the nerves of the foot; for it was ascertained very soon after, that the skin of the foot was insensible, and apparently the muscles had lost their power of contracting; at the same time a burning pain, and feeling as if crushed, were induced in the foot. It

is not easy to ascribe these effects to any thing else but to the deficient supply of blood to the branches and extremities of the nerves, for the trunk of the nerve was undisturbed and uninjured. The progress and appearances of mortification from sudden deficient circulation, were well exhibited, and minutely noticed. They seem to confirm the opinion, that, even in mortification from deficient circulation, a certain degree of reaction or inflammation precedes the complete death of the part, as was shewn by the vascular congestion, the swelling, the increase of heat, and the tense vesications which took place on the foot and leg. They also support the very graphic description which has been given by Mr Guthrie of gangrene from injuries of the main trunks of the arteries of the extremities*. The commencement of the disease in the extreme part of the limb, the increase in its rapidity, and the more acute and inflammatory character of the gangrene, after it reached the lower part of the leg, were very distinctly marked.

CASE II.—The next case I have to notice is that of a gentleman, 52 years of age, who was under the care of my friend Mr W. Wood, and who was visited during his illness by Dr Thomson and Dr Abercrombie. He was first taken ill in January 1821. His complaints were not of a very defined character,

* See a Treatise on Gun-shot wounds, &c. 2d Edition, p. 129.

nor did the symptoms indicate much danger, except from their continuance. He became weak and emaciated, with quickened pulse and occasional feverish feelings, and sometimes complained of a slight transient uneasiness across the epigastric region. Although he was able to take a good deal of food, these symptoms continued, and at last he was attacked with diarrhœa, three days after which he died, on the 5th of July of the same year.

A few weeks before his death, while turning his hand behind his back, to put it in his coat-pocket, he experienced a sudden acute pain at the bend of the elbow joint, and a sensation of numbness in the hand and fore-arm. On examination, a slight hardness was felt in the fore part of the elbow joint, which was painful on pressure. No pulsation could be felt in any of the arteries of the fore-arm, but in the humeral artery the pulsation was natural as far as the elbow joint. In a few days the pulse could be again felt in the fore-arm; and after a few days more, a similar accident occurred, in the same manner, but the pulsation in the fore-arm never returned. The pain at the elbow gradually abated.

On examining the body after death, a considerable abscess was found in the spleen. On inspecting the arm, the humeral artery, about half an inch above its division into the radial and ulnar branches, was found firmly adhering to the surrounding cellular substance, which was indurated, (Plate II. fig. 1. *a*). On slitting open its tube, the artery was found contracted, and completely obliterated at this part, the

internal parietes adhering firmly together *(b)*. The outer coat of the artery seemed incorporated with the surrounding parts. Immediately below the obliteration, the inner coats appeared to terminate in an abrupt edge, and they could also be seen terminating in a distinct margin at the upper part. Above the obliteration, the vessel contained a firm coagulum of lymph *(c)*.

I have given the account of this case chiefly from a statement of it published by Dr Abercrombie, in a paper on Diseases of the Spleen *, and partly from information afforded me by Mr Wood, and by my own examination of the artery after death.

When the stoppage of the circulation in the arm, in the case first related, took place, it naturally excited speculations as to the cause of so singular an occurrence. The idea immediately suggested itself to Dr Thomson, that the obstruction was produced in the same manner as hæmorrhage is sometimes prevented in arteries which have been torn across, and, as he believed, obstruction of the arteries had been occasioned, in some cases of gunshot wounds which he had observed, where the ball had passed close to the trunk of an artery without dividing it; viz. by the laceration of the internal coats of the vessel, and the projection of their edges and flaps into its tube, by which an obstruction is immediately produced to the passage of the blood, the detained portion of this fluid coagulates, and afterwards the vessel is obliterated

* Edinburgh Medical and Surgical Journal, vol. xxii. p. 4.

by the adhesive inflammation excited in the site of the lacerations.

It is well known that lacerated wounds bleed less than incised wounds of the same parts; and it has also been shewn, by numerous cases, that, even where large arteries are ruptured, the hæmorrhage ceases more readily than in such arteries when cut; and, in some cases, where even the largest arterial trunks of the limbs have been torn across, no bleeding, or only a very slight one, has occurred. There are various instances in the records of surgery, of limbs torn off near to the trunk of the body, which establish these facts. Among these, perhaps, the most remarkable are the well known case recorded in the Philosophical Transactions, of the young man who recovered after his arm, along with the scapula, had been torn away by the wheel of a mill, and in whom the bleeding speedily ceased, and did not recur, although no means were taken to obstruct the artery *; and one which occurred to Mr Carter, a surgeon at Kettle, in which the thigh of a boy was torn off at the groin by the wheel of a slitting mill, and in which no bleeding took place during four days that the patient survived the injury †. There are numerous other cases of the same kind, to which I consider it unnecessary particularly to refer; but I may remark, that no satisfactory explanation is given in the accounts of any of them, of the cause of the absence of the bleeding.

* Philosophical Transactions, vol. xl. p. 313.

† Medical Facts and Observations, vol. i. p. 17.

When an artery is torn across, the edges of the division of the coats is irregular, and the vessel has a tendency to retract into the cellular substance, which also is divided with a ragged surface. The blood will thus flow less freely, and will be more entangled in its passage from the orifice of the vessel, than in an artery cut across, and a greater tendency in the blood to coagulate be thus produced, which is known to be one of the means by which nature opposes an obstruction to the flow of blood from the orifice of a vessel, when hæmorrhage spontaneously ceases. This effect will be still more certainly produced, if the artery has given way within its sheath, at some distance nearer the heart, than the surface of the wound, and a portion of its tube has been drawn out, as has occurred in some of the cases of limbs torn off, which have been recorded. But these circumstances are obviously by no means sufficient to account for the very slight bleeding, or the total absence of it, in cases where the large trunks of the arteries of the limbs have been divided by laceration. Indeed, we know, that, in many cases, profuse, and even fatal hæmorrhage has taken place from torn arteries, or those divided in contused wounds, both in accidents in the human body, and in experiments on the lower animals.

From conversations with Dr Thomson, and from his lectures, I have learnt, that, when he began to give lectures on surgery, his attention was particularly directed to the subject of hæmorrhage, and to the means by which nature obstructs the flow of blood from arteries, in cases in which the bleeding

spontaneously ceases, or does not take place; of which, those where limbs had been torn off without bleeding, or with only a slight degree of it, especially attracted his notice. He made various experiments on the effect of violence on the arteries in the dead body. He was aware of the fact which had been long ascertained, that the internal coats of the arteries are less extensible and more friable than the external coat. He found, that if an artery be forcibly elongated, the internal coats first give way, the external continuing to stretch. He also found, as had been ascertained by the experiments of Nichols, that if an artery be violently distended by a fluid thrown into it, the internal coats are lacerated, the external coat remaining entire; and he confirmed the observation made by Desault, illustrating the same fact, that, on tying an artery firmly with a ligature, the internal coats are cut through in the course of the thread, while the external remains undivided. When the inner coats were lacerated, and fluid injected into an artery, he remarked, that they were separated from the external coat; and, projecting into the canal of the artery, obstructed the flow of the fluid through it; and that, if the fluid was continued to be propelled, it insinuated itself under the torn portions of the inner coats, and dilated the external tunic in the portion of the artery nearer to the syringe than the site of the detached flaps.

About this time, a case occurred to Dr Thomson, of a lacerated wound of the hand in a young man,

in which the soft parts between the metacarpal bone of the thumb and of the fore-finger were torn asunder by the bursting of a pistol. A considerable portion of the radial artery hung out from the wound on the back of the hand, with an open mouth, yet no blood flowed from it, though the pulse was distinct at the wrist. These circumstances convinced Dr Thomson that the obstruction to the hæmorrhage must have been produced by some change within the tube of the vessel itself; and he conjectured, that it was by the laceration of the internal coats, which he had often produced in the dead body on the forcible elongation of arteries; and which he had found to prevent the flow of fluids through them, when thrown into them by a syringe.

This conjecture, though sufficiently probable, was not verified by any observation on living animals, until the period of the investigations undertaken by the late Dr Jones, at the suggestion of Dr Thomson; the important results of which were published by Dr Jones, in his well-known valuable work, entitled "A Treatise on the process employed by Nature in suppressing Hæmorrhage from divided and punctured Arteries."

Dr Jones, in this work, has not particularly directed the attention of pathologists to the effect of the division of the internal coats in arresting hæmorrhage from lacerated arteries, although the fact is very distinctly marked in the relation of one of his experiments. The carotid artery of a horse was divided by a

sudden and violent pull of a director passed under it. The upper part of the artery retracted, whilst the other hung out of the wound three inches. The hæmorrhage was considerable from the former, and would have been profuse from the latter, but was prevented by making a ligature on it. The wound was closed, and the bleeding from the upper portion soon stopped: the animal was killed eighteen hours after the operation. On examination, the external coagulum was formed, as usual, in the canal of the sheath. To it adhered a long black coagulum, filling four inches of the canal of the artery. This was the internal coagulum, and purely of blood, yet it adhered to the artery in very many parts. To account for this unusual appearance, the artery was examined. Its internal coat had been lacerated in numberless parts, and at every laceration there had been an effusion of lymph, to which the internal coagulum adhered. In this instance, Dr Jones adds, contrary to all preceding and subsequent experiments, "the internal coagulum seems to have had some share in the security against hæmorrhage, but only in consequence of the injury done to the internal coats of the artery *."

The influence of the injury of the internal coats of a lacerated artery in preventing bleeding, were particularly pointed out by Dr Thomson, in his Surgical Lectures; and, in his work on Inflammation, he

* On the Process employed by Nature in suppressing Hæmorrhage, &c. p. 42.

states, in treating of wounds of arteries, "If, lastly, an artery, instead of being divided with a cutting instrument, be torn asunder, a very inconsiderable quantity of blood will in general be lost. The inner surface of the ruptured artery will be found torn in various places, contracted, and containing coagula of blood. This is a state of arteries which has been first accurately ascertained by Dr Jones, in his Experimental Investigations *." This explanation of the absence of hemorrhage in certain cases of ruptured arteries, I believe to have been new; and I do not find it mentioned in various systematic works on surgery, published since it was proposed. The late Professor Beclard of Paris, whose premature death must be regarded as a serious loss to the progress of the science of medicine, is the only author with whose works I am acquainted, who has adopted a similar view of the subject. In his work, entitled, "Additions à l'Anatomie Générale de X. Bichat," published in 1821, in speaking of the wounds of arteries by laceration, he says: "J'en ai rassemblé un certain nombre d'observations prises dans les auteurs; la plus remarquable est celle de Samuel Wood, rapportée dans les Transactions Philosophiques, et depuis dans divers ouvrages. Dans quelques-unes de ces observations, la mort a été la suite d'une hémorrhagie abondante; mais dans le plus grand nombre, comme aussi dans les expériences que j'ai faites sur les animaux, la guérison a eu lieu. Outre la rétraction et

* Lectures on Inflammation, p. 512. 1813.

le resserrement indiqués par Bichat (page 310), deux causes s'opposent encore dans ce cas à l'écoulement du sang et favorisent l'oblitération de l'artère. En effet, à l'instant même de l'accident, celle-ci cède et s'allonge avant de se rompre ; mais les membranes internes, moins extensibles, se déchirent d'abord inégalement et en divers endroits, puis se séparent complètement, tandis que la tunique celluleuse continue à s'allonger, en se rapprochant de plus en plus de l'axe du vaisseau, comme le fait un tube de verre fondu qu'on tire par les deux bouts. Quand la séparation est achevée, l'artère offre donc à son extrémité un prolongement conique, terminé par une ouverture étroite, et dans son intérieur des lambeaux irréguliers qui en obstruent la cavité. Cette dernière circonstance paroît la plus importante des trois, car, 1°, la rétraction manque souvent, le bout de l'artère est pendant, sans qu'il y ait pour cela d'hémorrhagie ; 2°, en coupant sur un animal le sommet de l'espèce de cône que représente l'artère, on ne renouvelle l'écoulement du sang qu'autant que la section est pratiquée au-dessus des déchirures intérieures*." Beclard, in his Anatomie Générale, published in 1823, in speaking of the cessation of bleeding from arteries torn across, also states : " On a attribué cette cessation prompte et définitive de l'hémorrhagie, qui a presque toujours lieu dans ce cas, à la retraction de l'artère, et à d'autres causes imaginaires : beaucoup de cas observés dans l'èspece

* Additions, &c. p. 95.

humaine, et beaucoup d'expériences fait sur les animaux, m'ont convaincu que c'était aux ruptures intérieures plus ou moins multipliées qu'éprouve l'artère avant de se deviser totalement en un point, qu'il fallait attribuer ce phênomène remarquable. Les phénomenes consecutifs sont les memes qu'après la section transversale.*" Whether Beclard was led entirely to the observation of these phenomena from his own experiments, he does not mention; but he does not refer to any other authority. The works of Dr Jones and of Dr Thomson were given to the world long before his were published; and I know that the preparations of the obstructed arteries of the first case I have related, preserved in the Museum of the College of Surgeons, were shewn, and their pathology explained to him, several years before the appearance of his works, from which I have made the foregoing extracts.

There are but few cases recorded, in which the state of the arteries torn across has been ascertained by examination, in the human body. Besides those mentioned generally by Beclard, I shall shortly notice some, which illustrate the subject, and appear to me to confirm sufficiently the explanation I have stated, of the absence or speedy cessation of hæmorrhage from vessels in such circumstances.

The first which I shall relate, is one which occurred in the Royal Infirmary here in the year

* Elemens d'Anatomie Generale, p. 384.

1811, under the care of my friend Mr Newbigging, the particulars of which have been kindly communicated to me by Mr George White, who was then his clerk.

William Elliot, aged 18, was brought into the hospital on the 29th March, at the hour of visit, having about two hours before got the right arm and left thumb shockingly mangled by the rollers of a lint mill. The axillary artery, which was exposed, had been ruptured about three inches below the axilla, and a coagulum of blood, of about three-fourths of an inch in length, had been formed in the proximal extremity of the vessel. The axillary plexus of nerves was as bare as if it had been dissected. The parts around the shoulder joint, and below the clavicle, were quite undermined. Amputation, a little below the joint, was immediately performed by Mr Newbigging, who removed the arm, so as to get a flap from the tattered integuments to cover the bone, which was sawn about two inches below the joint, removing only the ragged extremity where it was fractured. The axillary artery was tied a little above the coagulum. Three other arteries were also secured by ligature. As there was a considerable oozing of blood from the end of the bone, a dossil of lint was applied to it. The stump was then dressed in the usual way. Sloughing took place of the lacerated soft parts, and of a portion of the neighbouring integuments, after which the wound granulated. In the progress of the case,

abscesses formed over the sternum, a small portion of bone exfoliated, and the patient became affected with diarrhœa and sweating, and the granulations unhealthy and indolent, so that the progress of the cure was slow. In July, his general health had improved, but the sore was still unhealed, and, as his residence in the hospital was thought to retard his recovery, he was advised to go into the country. The sore afterwards completely healed. Mr White had, a few weeks ago, the pleasure of accidentally meeting his patient in good health.

Mr White examined carefully the amputated arm. On tracing the humeral artery, it was observed to be swollen out at several places into little knots, between which it appeared contracted; and, on slitting it up, it was found that this appearance was produced by the internal coats having been lacerated at various parts and coiled up within the external coat which remained entire, so as completely to obstruct the canal of the artery. In the description of the case I have given, which is that drawn up by Mr White, when the man was received into the hospital, it is stated, that a coagulum of blood had been formed in the torn axillary artery, about three-fourths of an inch in length. Mr White has since mentioned to me more particularly the appearances that presented themselves. Immediately above the torn orifice of the artery, from which no blood flowed, it appeared swollen out into a bulb. This enlargement exactly resembled those he found in examining the hume-

ral artery. No opportunity was afforded of examining the state of the portion of the artery above, as, after the ligature was applied beyond it, it was left attached to the stump; but Mr White has no doubt that the knot on its extremity was produced in the same manner as those in the course of the humeral artery.

The next case I have to mention is one which occurred to Mr Lizars, and has been published by him as illustrating the manner in which nature stems the bleeding of a great vessel. It is that of a gentleman, who, in the overturn of a mail-coach, was thrown from the top, had his leg entangled under the iron-rail, and was dragged with his limb in this position for a short distance. The leg was dreadfully shattered, and the ham exposed to the bone, exhibiting the nerves, bloodvessels and muscles, as if they had been displayed for demonstration. The popliteal artery felt like a cord, had no pulsation, and the leg below was cold and lifeless. Amputation above the knee was performed about six hours after the injury, and the patient recovered. Previously to examining the amputated limb, Mr Lizars attempted to inject the popliteal artery, but little or no injection entered. On examining the arteries, the anterior tibial, the posterior tibial, and fibular branches, were found empty and collapsed. The popliteal artery was then laid open, when, at one part, the serous and muscular coats were seen ruptured across, a portion of them insulated and plugging up the vessel; and, above this, a clot of blood in the artery, and blood

effused under the cellular coat, which had remained comparatively sound and entire. Mr Lizars has accompanied his description by a delineation of the artery, which illustrates very distinctly the state of its coats*.

This case proves very satisfactorily the effect of the violent elongation of an artery in the living human body, in producing a laceration of the inner coats, while the external coat remains entire; and also the complete mechanical obstruction of the canal of the artery which is produced by this.

Another case, to which I may refer, is one which occurred to a Dr Mudie of Montrose, so long ago as the year 1761, and published under the title of an Amputation of the Arm without Hæmorrhage, —an occurrence which appeared to the author extraordinary and not easily explicable.

A vigorous woman, thirty years of age, had her hand caught in the machinery of a lint-mill, and her fore-arm and arm drawn into the mashing machines. By this the fingers and hand were severely crushed, and several of the bones of both broken, the ligaments at the wrist torn away, the radial artery divided at the place where the pulse is felt, the fore-arm and arm very much contused, particularly at their articulations, and the os humeri broken within $2\frac{1}{2}$ inches of its upper end. Amputation was performed immediately above the fracture of the humerus. On slackening the tourniquet no blood squirted from

* Edinburgh Medical and Surgical Journal, vol. xix. p. 365.

the brachial artery, nor could any pulsation be observed at its extremity; and although no ligature, compression or styptic was applied to it, no bleeding took place during the cure *.

In this case there was nothing in the state of the orifice of the artery or surrounding parts to prevent the flow of blood, for they were fairly cut across by incision; and I can have no doubt that the hæmorrhage was prevented by laceration and coiling up of the inner coats of the artery having been produced above the part where it was divided, by the violent elongation and contusion to which this vessel had been subjected.

Dr Thomson had an opportunity of seeing some cases which appeared to confirm the opinion he had formed, in instances of cannon-shot wounds which occurred at the battle of Waterloo. In a dissection which he saw made by Deputy-Inspector Guthrie, of a limb cut off above the knee for mortification, in consequence of a contusion by a cannon ball on the posterior part of the leg, the tibial and peroneal arteries had been torn across, and about two inches above this the popliteal artery was found closed in the lower part of the ham by coagulable lymph, which seemed to have proceeded from a rupture of the internal coat of the artery.

In another case, that of a man whose leg had been shot off by a cannon-ball, it was remarked, on

* Essays and Observations, Physical and Literary, vol. iii. p. 502.

amputating his limb above the knee, that the arteries of the thigh did not bleed, nor did any of them afterwards require to be tied.

A case similar to this also presented itself, in which the arm had been shot away close to the shoulder-joint *.

In the two cases of sudden spontaneous obstruction of the trunks of the arteries which I have related, the appearances in dissection seemed to verify the conjecture formed by Dr Thomson, as to the cause of that phenomenon; but, in both, from the interval which had elapsed between the occurrence of the accident and the death of the patients, and from the parts having been consequently altered and matted together, by the inflammation which had been produced, it was impossible to determine exactly what had been their original state when the cessation of the pulse took place. This, however, was satisfactorily ascertained in the following case that occurred to Dr Abercrombie, which he some time ago pointed out to the notice of the Society. He has obligingly furnished me with notes of it, and I feel greatly indebted to him for permitting me to insert it here, as, in my opinion, it adds very materially to the value of the series of observations on the subject of which I am treating.

* Report of Observations made in the British Military Hospitals in Belgium, &c. p. 23.

CASE III.—John Anderson, aged sixty-three, of regular and sober habits, and enjoying good health, was, in October 1819, much exposed to cold, after which, about the end of the month, he was affected with pain in his head and back, accompanied by shivering, but was not confined to the house. About the 6th of November he complained of a fixed pain about the top of the right thigh and groin, and after a day or two the thigh became numbed and weak, the muscular power of it being considerably impaired. On the evening of the 11th he observed swelling of the leg, first at the ankle. On the 12th the limb was swelled throughout, and was emphysematous, crackling when handled at every part. When punctured, it discharged a fetid gas, and some dark coloured fluid. The colour of the skin was at first little changed, or rather red, but towards night it began to be livid in many places, and large vesications appeared upon its surface. He died early on the morning of the 13th, having sunk gradually, but rapidly.

On examination of the body after death, there was found a great quantity of a dark-coloured fluid effused into the limb, and the muscles universally dark and gangrenous; and behind the peritoneum, on the right side of the abdomen, there was a large gangrenous cavity, containing much dark-coloured fluid, and ill-conditioned pus. The femoral artery being laid open, there was found disease in several places of the inner coats. These were soft, and separated at various points from the outer coat, so

as to lie across the area of the vessel like valves. One of them was about a third down the thigh, and there were others less remarkable. On slitting open the external iliac artery, the inner coats were found soft and thick, and at one place completely lacerated in the whole circumference of the artery, and separated from the external coat for nearly an inch and a half, the portion thus separated having fallen down and coiled up, so as completely to obstruct the canal of the artery nearly at the place where it passes under Poupart's ligament, Plate II. Fig. 2. *a*. Between this and the origin of the internal iliac artery, there were considerable lacerations of the inner coats. In two places they were slightly detached from the outer coat, and their edges projected into the tube of the vessel *b*, *c*. Above the obstruction at the lower part of the iliac, produced by the more extensive laceration, there was a coagulum of blood in the artery. The aorta was in several places diseased; its internal surface ulcerated, and the inner coat partially separated. In some of the smaller branches of the arteries in the pelvis there was ossification, but none in the right iliac artery, where this singular disease was situated. The left iliac artery appeared sound. No other diseased appearances were detected.

In this case death took place so rapidly, that the inflammation had not time to alter materially the appearances of the parts; and in it, it is obvious that the obstruction to the circulation was produced by the torn and detached internal coats of the artery.

Besides these three cases of the sudden obstruction of arteries, in which the state of the vessel was ascertained by anatomical examination, I shall now adduce some others, in which an opportunity of examining the parts by dissection has not occurred, but the symptoms and progress of which appear to me clearly to shew, that they have been of the same nature as those to which I have already directed the attention of the Society.

Case IV.—On the night of 4th June 1815, a German, of middle age, a strong muscular man, and old soldier, got very drunk, and fell down a steep stair. I was sent for, and saw him very soon after the accident. I found his right elbow-joint violently sprained, and a great degree of swelling and tension in the soft parts all around it. I could not discover any fracture or dislocation, but the joint appeared to me looser than natural, as if some of the ligaments had been torn. I was surprised, on endeavouring to feel his pulse at the wrist, not to be able to discover any pulsation in the radial artery, and I could not detect any in the ulnar, nor in any part of the arteries of the fore-arm. The pulsation of the humeral artery was distinct, and could be traced to the bend of the elbow. I was enabled to examine the parts very freely, as the intoxication seemed to have rendered the patient quite unconscious of his situation, and insensible to pain. He did not complain, in the least degree, on the parts being handled or moved; and he continued occupied in giving cheers to the

health of the king, frequently waving the injured arm round his head; and he remained in this state for a considerable part of the night, when he at last fell asleep. Next morning he was in a very different condition. He suffered severely from the usual symptoms which follow a debauch. He complained, in addition, of soreness in several parts of his body which had been contused; and he had violent pain in the arm, not being able to bear the slightest pressure or motion of the parts. The swelling and tension were rather increased. The absence of pulsation in the arteries continued.

He was, at this time, sent to the Royal Infirmary, where he remained till he recovered. I accidentally was prevented from seeing him there, for more than a fortnight after his admission. At that time, under the usual treatment, the swelling and pain of the elbow-joint had almost entirely subsided. On examining the arteries of the fore-arm, I could not discover any distinct pulsation in any of them; and the pulsation in the humeral artery could be distinctly felt to the fore-part of the elbow-joint, where it suddenly ceased. The fore-arm was pale, and the veins much smaller and more collapsed than those in the other arm; and when they were compressed, they filled very slowly. The sensation and motion of the fore-arm and hand were perfect. In a short time he was dismissed from the hospital cured, and I had no opportunity of afterwards seeing him; but I heard that he appeared to have got

quite well, and that no defect or inconvenience had been occasioned by the injury.

In this case, there appears to me to be no way of accounting for the cessation of the pulse, except by supposing that it had been produced in the same manner as in the cases I have already related. It is impossible to conceive that the artery had been entirely torn across, as, had this happened, there must have been an extensive effusion of blood into the cellular substance of the arm and fore-arm, of which there were no symptoms; nor can we believe that the pulse was stopped by pressure from the effusion into, and consequent tension of, the parts surrounding the artery. Usually no such effect is produced; and I conceive the stoppage would not have been permanent, but that the pulsation would have returned as the swelling and tension abated, as they began to do very soon after the accident.

Case V.—Mr Bryant, a surgeon in Edgeware Road, has related a case of obliteration of the external iliac artery, followed by gangrene and mortification of the foot and leg, of which the following is an abstract. The patient was a lady, twenty-eight years of age, who, for five years, had been subject to occasional pains in the region of the pelvis; and, during this period, had also suffered from three or four attacks of gout in the right extremity. Ten months before the attack, now to be described, she had received a very trifling blow in the groin from the basket of a laundress, which was followed by slight

temporary pain. She had likewise a little enlargement of the inguinal glands, occasioned by excessive exercise on horseback.

On the 21st January 1822 she was affected with acute pain in the right hypogastric and iliac regions, with quick and full pulse, and other symptoms of inflammatory fever. For these symptoms she was freely bled, and treated antiphlogistically. On the fifth day the pain had ceased in the iliac region, but had attacked the course of the ureter and kidney. By free local bleeding, and other appropriate remedies, this pain also was relieved, and the fever diminished; but she complained of slight uneasiness in the left groin, increased on pressure. On the evening of the 28th, seven days after the commencement of her ailments, while using the hip-bath, she was suddenly seized with numbness, and coldness of the left extremity, succeeded by severe pain in the calf of the leg. The coldness, and the pain of the leg which extended to the ankle, continued, with great diminution of the sensation of touch. On the fourth day after the attack of numbness, petechial spots appeared on the foot, with total loss of sensation, and the calf of the leg swelled, and became exquisitely sensible. From this time the gangrene of the foot went on, the symptoms resembling very much those which occurred in the first case related in this Essay, but the affection was more acute in its character; and, after the gangrene passed beyond the ankle, a stop to its progress took place, a separation between the dead and

living parts began, the progress of the disease being attended with intense suffering, and great danger. In six weeks after the commencement of the mortification the bones of the leg were exposed, which, in a short time after, were sawn through as close to the soft parts as possible. After this the wound granulated; and, at the last report in July, was healthy, a portion of the fibula being in progress of exfoliation. Very soon after the first attack, it was observed that no pulsation could be felt in the femoral artery; and, on examination after the dead parts were removed, no pulsation could be felt in the artery, as far as the bifurcation of the common iliac, nor could any aneurismal tumour, or other unusual appearance, be traced in its course *.

During her illness, this patient was attended by Mr Cline, Mr Brodie and Mr Clarke, who, it is stated, had never seen a case exactly alike, and who were of opinion, that the obliteration had been produced by injury done to the external iliac artery. There can be little doubt, I conceive, that it has been a case of the same nature as those I have described. It illustrates the fact, that, in mortification from the obstruction of the main trunks of arteries, although the collateral circulation may not be sufficient to nourish and preserve the vitality of the whole limb, yet it may be sufficient to supply a considerable part of it below the place where the vessel is obstructed.

* Edinburgh Medical and Surgical Journal, vol. xix. p. 45.

The next case I have to mention, is one which occurred to my friend Dr Gairdner, who observed it very carefully during its progress. Unfortunately, from accidental circumstances, the body of the subject of this case, who died a few months ago, was not examined. Dr Gairdner intended himself to have laid this case before the Society, but, on learning that I was occupied in preparing a paper on the subject, he was induced kindly to forego his intention, and to permit me to enrich my Essay, by adding it to the others I had collected. I give it in his own words, as communicated to me in the following letter.

CASE VI.—"DEAR SIR, I take my pen, according to promise, to put you in possession, as far as I am able, of the history of the remarkable case of arterial obstruction, which you once saw with me. The subject of it was by trade a carpenter, and was upwards of thirty-nine years of age in the month of October 1824, at which date this narrative commences. In the course of that month he met with an unfortunate accident. On withdrawing from his work-shop at a late hour, he fell backwards over an outer staircase,—a height of about twelve feet. He was pretty severely bruised about the ninth and tenth ribs of the left side, and his left humerus was dislocated; he was also very much stunned. With the assistance of Dr Robert Hamilton, who saw him immediately after the accident, I succeeded, without much difficulty, and without the application of any great

degree of force, in reducing the dislocation. The pain in the side next demanded attention, more especially as it became accompanied with cough, difficulty of breathing, and some degree of fever. Several days were consumed in vanquishing these symptoms, by the usual remedies,—venesection, purgatives, and the local application of saturnine lotions; by these the fever and pain were removed, and the cough greatly diminished, though not entirely banished. During the time that he was confined to bed after the fall, the arm which had been dislocated was, of course, carefully tied up, and I always felt his pulse at the opposite wrist; but one day I chanced to put my finger on the wrist of the left side, and discovered, to my great surprise, that there was no pulse to be felt. I examined the whole course of the radial, humeral, axillary, and subclavian arteries, as far as it was possible to trace them with the finger; there was no pulse in any part of these vessels. In the carotids the pulsation was natural, the affected arm was coldish and pale, and the veins on the back of the hand were much less distended than those of the right hand. Desirous that facts so remarkable should be witnessed by others besides myself, I submitted the patient, about this time, to the inspection of Dr Thomson and of Dr Robert Hamilton; and both these gentlemen satisfied themselves, by minute examination, of the accuracy of the above statements.

After this accident, my patient was never entirely well; he had been liable to coughs before its oc-

currence, but after it, he was scarcely ever without some degree of cough, which was accompanied with a little mucous expectoration: he was disturbed occasionally by palpitation at the heart, especially on going up an ascent, and was often obliged to stop short in the middle of a slight acclivity, in consequence of dyspnœa, and an indescribable sensation of anxiety in the region of the heart. I never happened to see him on one of these occasions, but I have examined his heart at other times, both by auscultation and otherwise, and I never could detect any defect in its rhythm, or irregularity in its pulsations.

"On the 19th of March 1825, rather more than five months after the accident above mentioned, he sent for me in the evening. I found him much alarmed about what he conceived to be a paralytic affection of his *right* arm, in which he had been suddenly seized with a sensation of numbness and coldness. On examining the arm, I was immediately struck with the similarity of its appearance to that of the left arm formerly; it was colder than the opposite limb; the veins on the back of the hand were flaccid; a paleness of the skin indicated an imperfect circulation in the cutaneous vessels; and the pulse, as in the former case, was imperceptible at the wrist. The arm was less capable of exertion than usual; its strength was diminished, but its muscles obeyed the will as readily and with as much precision as at other times; and though he complained that he felt as if it were benumbed, yet I ascertain-

that the sense of touch was sufficiently acute for all useful purposes: there was no pulsation in any part of the arteries of the fore-arm, nor in the lower part of the humeral artery; but the subclavian and axillary arteries were found to pulsate freely. Pulsation was also felt in the very beginning of the humeral artery, but none whatever in the rest of its course. Having ascertained the exact spot where the artery was interrupted, I made, with the point of my finger, a little pressure on it, which gave him a slight sensation of pain; the same degree of pressure applied one finger's breadth higher up, or lower down, produced no feeling of this description. I have therefore no doubt, that, at the obstructed part, there was a disease or laceration of the inner coats of the artery; but, although I questioned my patient most minutely on the subject, I could not discover that any blow or bruise on the part, or any sprain of the arm, or even any unwonted exertion, had preceded those symptoms which had so suddenly alarmed him. The *left* arm had by this time recovered its customary power and warmth; and the colour of the skin, and the degree of distension of the veins were indicative of increased freedom of the circulation. No distinct pulsation could, however, be felt in the great arteries of the limb. A very feeble pulse, indeed, could occasionally, and only occasionally, be discovered; but it was so very slight, that I should have had much difficulty in numbering the pulsations of the heart by means of it.

"In the months of April and May, he was much

distressed with his pectoral symptoms, and with the palpitations and inability for exertion: he became much better in June, and continued so till the beginning of November. Upon the 10th of that month I was called to him, and found him labouring under severe catarrhal symptoms, fever, cough and dyspnœa, mucous *rale*, and copious viscid expectoration, sometimes a little streaked with blood. In the course of a week, these symptoms increased to an alarming degree; the urine, at the same time, fell short, and the legs became œdematous. It is unnecessary to enter minutely into the circumstances of the treatment; it is sufficient to say that, by moderate evacuations, together with blistering, and the use of diuretics, the symptoms, which at one time seemed almost insurmountable, were gradually overcome, and by the middle of the following month he was enabled to return to his customary occupation.

"On the 8th of April 1826 he had a sudden attack of paralysis of his left side; the muscles of the face were evidently distorted, and those of the left leg were so much paralysed, that he dragged the limb in walking across the floor,—there was also, for one or two days, a degree of delirium. All these threatening symptoms, however, disappeared entirely in three or four days, and he enjoyed better health during the rest of last year, though he never became strong or free from his pectoral symptoms.

"In the early part of January last he went on a journey of nearly 60 miles in very severe weather,

notwithstanding the repeated warnings which I had given him of the injury that might arise to his impaired constitution from exposure to cold. In the very night after he arrived at the end of his journey, he was seized with an asthmatic attack, similar to that from which he had suffered in 1825. It was attended from the first with bloody sputum, and the quantity of blood increased rapidly as the disease proceeded. In the course of a few days the dyspnœa increased very much, notwithstanding repeated blistering, and other remedies employed to arrest it; the legs became œdematous, he rapidly lost strength, and died on the 15th of January at Dunkeld, which was the scene of his last illness. Immediately on hearing of the fatal termination of his disease, I wrote to Mr Fletcher, who had attended him there, requesting him to ascertain the state of the heart and arteries by dissection, and giving him a detailed statement of my reasons for this request. To this letter I received a very polite reply, in which Mr Fletcher expressed his regret that my communication had arrived too late to be of any service.

"I am very sorry that this important case should be thus left incomplete in its details. I am sensible that this imperfection takes much from its value; but I hope it will appear to you of sufficient interest to deserve a place in the series of cases which you propose to communicate to the Medico-Chirurgical Society. I am, My dear Turner, yours very faithfully, JOHN GAIRDNER.

18. HILL STREET,
15*th February* 1827."

To these cases I may add one published by Mr J. Marshall of Leeds, so far back as the year 1813, as there appears to me every reason to believe, from its history, that it has been of the same nature with those I have described.

CASE VII.—An old worn out quarter-master of a ship was attacked by retention of urine, in consequence of stricture. The retention relieved itself after the use of an opiate, a bougie was passed, and the patient passed a tolerably easy night, but on waking in the morning he found the use of the right arm entirely gone. On examination, the fore-arm was found benumbed, cold and stiff, and no pulsation could be perceived in any part of the brachial artery, from the subclavian downwards. On the third day the fingers became livid, and the hand discoloured, and pain ensued in the fore-arm, the lower part of which also became livid. On the 15th day a line of demarcation shewed itself between the dead and living parts, a little below the elbow, and amputation was then performed above the joint. Although the patient was in a most unpromising state at the time of the operation, the wound healed chiefly by the first intention, and was cicatrized in a month, and he ultimately completely recovered *.

After a careful perusal of three cases, related by Dr Storrer, in a paper entitled, "An instance of the entire want of Pulsation in the Arteries of Pa-

* Edinburgh Medical and Surgical Journal, vol. ix. p. 449.

ralytic Limbs," I am disposed to believe that they also are to be regarded as of the same nature as those which have been described *.

CASE VIII.—The first of these, which came under Dr Storrer's own observation, was that of a lady about fifty years of age, who was attacked with fever of a mild kind, which in a few days put on a remittent form, and became attended with marks of determination to the lungs, the symptoms resembling, in a very remarkable degree, those which occurred in Case I. By bleeding and antiphlogistic treatment, these complaints abated, and in the third week of her illness the patient seemed to be gradually improving

At this period, however, after a disturbed night, she was suddenly affected with what is described as a paralytic affection of the whole left side of the body, but without any corresponding affection of the face or speech, or any disturbance of intellect. This was accompanied by excruciating pain in the shoulder, extending to the elbow, soon followed by violent pains in the calf of the leg and foot. She had some capacity of moving the shoulder, but scarcely any of moving the fore-arm and hand; the thigh and leg were in the same paralytic state, possessing a very obscure degree of sensation and motion, and the foot and hand were insensible even to the prick of a needle. No pulsation could be felt in the fore-arm or arm, but the subclavian artery was observed to

* Transactions of a Society for the Improvement of Medical and Surgical Knowledge, vol. iii.

beat distinctly; and Dr Storrer was unable to perceive any trace of pulsation in the groin or in the ham. During the ensuing four days, the powers of sensation and motion in both extremities were gradually very considerably restored. The pulse did not return, and it diminished in force, so as hardly to be perceptible in the portion of the subclavian artery, in which it was at first distinct. On the fifth day she became affected with uneasy feelings, and attacks of suffocating sensations in her chest, with hurried respiration, and died suddenly during the night. Unfortunately an examination of the body after death was not permitted.

Dr Storrer regarded this case as one of hemiplegia, but was much at a loss to account for the absence of pulsation in the arteries. He conceived that this could not depend on obstruction in their tubes, from the improbability of this occurring in both limbs, and from the absence of any external marks of the cause of such obstruction, and also from the gradual cessation of the pulse in the subclavian artery; and he suggests the hypothesis that it might depend on a palsy having been produced in the coats of the arteries, which he states would completely explain all the phenomena.

Now, even supposing that the coats of the arteries were paralysed, it appears to me that this would not give rise to a cessation of the pulse, for the blood would be still propelled into the pervious arteries, and would have an impulse communicated to it on each contraction of the heart. I can have no

doubt that, in this case, a sudden obstruction had taken place in the arterial tubes in the axilla, and above the groin; and that the paralytic symptoms were the consequence, and not the cause, of the interruption of the circulation. This supposition seems consistent with all the symptoms; and would also explain the disappearance of the pulse in the subclavian artery; for a coagulum might be expected to extend into it, to the first collateral branch above an obliteration of the artery at the upper part of the axilla.

Dr Storrer next relates a case, which was communicated to him by Mr Vickers, surgeon at Loughborough.

CASE IX.—In a man about sixty years of age, apparently in good health, while taking his breakfast, the hand which held the tea-cup dropped lifeless on the table. He felt no other ailment. In two hours after, Mr V. found the arm, it is stated, completely paralytic, and he could feel no pulse in it, while the pulse in the other arm was natural in strength and frequency. The arm was cold, and its colour pale; but it soon grew dusky, and the dingy appearance increased hourly. About four hours after the attack, the patient's constitution became affected, symptoms of sinking appeared, and he died six hours after the seizure. The state of the parts was not examined after death.

The third case is one which was brought to the recollection of Dr Wells, by the reading of the two

already related. It had been mentioned to him by Sir G. Fordyce, who had attended the patient, along with Dr Sequeira. Dr Wells communicated the particulars, which he obtained from the latter gentleman, to the Society.

CASE X.—A gentleman of sixty-two, in jumping over a puddle of water with tight boots on, suffered a disagreeable jar, and was slightly stunned at the moment. Next day he was attacked with pain in the right foot, and in about a week after with pain and swelling of his leg; and at the same time suffered from cough and difficulty of breathing, to which he was liable in winter. While things were in this state, he awoke one morning with excruciating pain in his left arm; and, in the afternoon, it became numb and motionless, and no pulse could be felt in it. He had no symptom of affection of the head, and his pulse in the other arm was natural. About the same time the pain and swelling of the leg disappeared. No change took place during the subsequent two days; but on the morning of the third, while making an exertion, he was seized with a convulsion or fainting fit, it seems uncertain which, and in a few minutes expired.

In this case, it is stated that the affected arm was examined next day by an eminent anatomist, who was unable to discover any organic disease in its bloodvessels. It is mentioned that the relations would not permit the head, thorax, or abdomen, to be opened; and it does not appear that the brachial

artery was traced to its origin, so that an obstruction above the clavicle may have escaped detection.

The late Dr Parry of Bath notices three instances which he had met with, in which the pulse ceased suddenly, in one arm, while it remained distinct in the other *.

CASE XI.—In the first, this took place two or three days after parturition, and was attended with coldness of the arm; but the power of motion remained. The other arm had lost all power of voluntary motion, but the pulse was distinct in it. The patient soon died, but a dissection was not obtained.

CASE XII.—The second was the case of a young man, affected with pulmonary hectic, who was found to have lost the pulse in one wrist, immediately after coming out of the warm-bath. Several months afterwards it had returned, though in an almost imperceptible degree.

CASE XIII.—In the third case, a middle aged female had been affected with a severe cough, from which she was convalescent, and was walking about her house, when it was discovered that the pulse in one arm was wholly wanting. A few days afterwards she died suddenly.

In the first two of these cases, it may be supposed

* On the Arterial Pulse, p. 139.

that the cessation of the pulse depended on a sudden obstruction of the artery, by rupture of the coats; but the third case is more difficult to explain, for it is stated that the whole course of the artery to the aorta was carefully examined after death, but no deviation from the natural state could be perceived in it. The particulars of the dissection are not related; and supposing that the artery had been only examined externally, it is possible that the morbid state I have described might have escaped observation. If the canal of the artery was actually pervious at the time of examination, some other cause of the stoppage of the pulse must be sought. I have already stated my reasons for believing that this could not be produced by a paralysis of the artery; and the only other supposition appears to be, that a spasmodic contraction had taken place in some part of its course, to which Dr Parry seems inclined to attribute the absence of the pulse in all these cases. On making experiments on animals, it has been observed by Dr Parry and others, that if a portion of the tube of an artery be exposed, a decided contraction sometimes takes place in it. It is possible that a similar contraction may take place in the human body, in certain circumstances, in an artery in its natural situation, but it must obviously occur extremely rarely; and notwithstanding this case by Dr Parry, I conceive that it still requires to be established, that such a state of the vessel ever actually has been produced.

It is a question worthy of consideration, What is

the cause of the sudden spontaneous rupture of the internal coats of the arteries? In cases where great violence has been suffered, as in Case IV, or in the reduction of a dislocation, as in the first stoppage in Case VII, it may be conceived that the inner coats of the artery, even in the healthy state, may have given way, without the infliction of an external wound. Richerand has stated, that, in the dead body, if the knee-joint be forcibly extended, till the ligament of the ham crack, and the limb be afterwards dissected, it will be found that fissures are formed in the middle coat of the artery, from the separation of its fibres from each other*. But in most of the cases of the affection which I have described, it seems necessary to suppose some predisposition in the coats of the arteries to laceration, as this took place on the ordinary motions of the limb, which, in their healthy state, the arteries usually permit without injury, and as these obstructions occurred in different arteries of the same individual. In the third case, there was obviously a tendency to disease in the internal coats in general; and in the parts where the lacerations occurred, they were found thickened, soft, and pulpy,—a state resembling that which is known to be produced by inflammation in these coats. But whether this state preceded, and was, as I believe, the cause of the laceration, or was the result of incipient inflammation, succeeding to that laceration, must be regarded as doubtful.

* Nosographie Chirurgicale, t. 4, p. 197, 5th ed.

In the other cases in which the bodies were examined, there was nothing remarkable, or apparently diseased, in the arteries examined, except at the parts where the obliterations had taken place. It must, therefore, at present be regarded as undetermined on what the tendency to laceration depends. In several of the cases I have related, a considerable degree of constitutional affection and fever preceded and accompanied the obstruction of the arteries. Is this to be regarded as connected with, or dependent on, the state of the vessels, which makes them liable to the laceration?

As to the practical results to be deduced from the account of this disease which has been given, there is little which can be said. The constitutional symptoms which have preceded the attack in several of the cases, appear to have had an inflammatory character; and, supposing that they may depend on a certain state of inflammation in the inner coats of the arteries, which by some pathologists has been regarded as the cause of a peculiar fever, and that this could be ascertained by the symptoms; the antiphlogistic plan of treatment appears to be that which holds out the greatest prospect of interrupting the progress of the disease. But it must be remarked, that, in two of the cases I have related, in which the constitutional symptoms were most distinctly marked, the first and the sixth, the antiphlogistic treatment was actively employed from the commencement of the illness, yet it had not the effect of preventing the obliteration of the arteries.

When the obstruction actually occurs, the lower part of the limb may be supplied with blood by anastomosis, as happened in several of the instances I have related; as in the obstruction of the lower part of the popliteal artery, and of the brachial artery in the first case, and in that of the brachial in the second; in the same artery in the fourth; and in the subclavian and axillary artery in the sixth and twelfth. In such cases, however, there will always be reason, I conceive, from the result of the cases I have related, to apprehend the occurrence of a similar affection in some other vessel, or that the patient may die suddenly from causes which are as yet involved in obscurity.

When the larger trunks of the arteries, where they pass from the trunk of the body to the limbs, become suddenly obliterated, there is reason to fear the occurrence of mortification of the limb, as happened in five of the cases I have detailed. In the first, indeed, the mortification was produced by the obstruction of the upper part of the popliteal artery,—a situation in which it might be conceived that the lower part of the limb would, without difficulty, be supplied by the collateral circulation. But, in this case, it must be remembered that this obstruction took place at a period when the patient was much debilitated by his previous illness; and when the lower part of the popliteal artery was already obliterated, which would create a considerable impediment to the supply of the distant part of the limb by the anastomosing vessels.

When the obstruction has actually taken place in an artery, the treatment to be adopted is obviously that which is found to be most advantageous after the ligature of the vessels in operation. The collateral circulation is to be promoted by placing the limb in a proper position, and by maintaining its temperature by wrapping it in flannel, and by artificial heat placed at some distance from it. I should conceive it necessary to be cautious not to be induced by the pain which may exist in the limb, to apply any considerable heat or cold to it, or to have recourse to stimulant applications, for these seem to be liable to excite gangrene in a part in which the circulation is stopped or much diminished.

When mortification takes place, the principal objects of the practitioner appear to me to be, to support the strength of the patient by nourishing diet and stimuli, in such quantity, and of such quality, as have not the effect of increasing the fever, or aggravating the local inflammation, and the proper exhibition of anodynes for the alleviation of the pain, while attention is paid to keep the bowels regular, without purging. It is a point for consideration, whether amputation should be had recourse to, when the gangrene has fairly commenced, as has been recommended, and, in some cases, successfully practised, by Mr Guthrie, in gangrene of the extremities, from gunshot wounds of the main arteries of the limbs; or whether we should wait for the stopping of the disease, and the commencement of the separation between the dead and

living parts? I may here remark, that it seems established by experience, that mortification is not so likely to ensue from the application of a ligature to an artery, by which the surrounding parts are little disturbed, as from a gun-shot wound of a similar bloodvessel; and that, when gangrene is produced by the first of these causes, it does uniformly spread till it terminates fatally, as, according to Mr Guthrie's observation, that does which is produced by the injury of an artery by gun-shot. There are various cases recorded of gangrene from the ligature of arteries having stopped, and separation taken place, between the dead and living parts, at a considerable distance below the point where the artery has been tied.

The greater frequency of gangrene, and its more malignant character, after a gunshot wound of an artery, than after its obstruction by ligature, may depend, as Mr Guthrie has suggested, on the neighbouring vein or nerve, being generally also injured in the former case; but it appears to me, that they may also, in some measure, depend on the swelling and tension produced by the inflammation excited by the wound, impeding the circulation of the blood through the anastomosing vessels, to the lower part of the limb. In the spontaneous obstruction of the arteries, I should conceive that the probably diseased state of the arterial system, and the affection of the constitution would be likely to render the success of the operation more doubtful than in a person in whom the gangrene has been produced by a wound,

and that the surgeon will be warranted in waiting till the mortification shews a tendency to stop. In two of the cases I have related, the gangrene stopped, and the patients recovered; the one, by the bones having been sawn through at the line of separation; the other, by amputation above this line. In the other three cases in which gangrene took place, I do not conceive that amputation was admissible, or held out any prospect of advantage.

The rupture of the internal coats of an artery is, however, by no means always followed by the obliteration of the vessel. It perhaps more frequently gives rise to aneurism. After a violent exertion, or a strain, the patient sometimes feels an acute pain in some part of the course of an artery; in a short time a tumor is discovered, which communicates the sensation of pulsation, at first small, but which gradually increases in size, and follows the progress of aneurism. Here the internal coats have been torn, and the external is dilated by the impetus of the blood; the canal of the artery above and below remaining pervious. The external coat is gradually extended, till at last it in some cases gives way, and the blood is effused into the neighbouring parts, forming a diffused aneurism, succeeding to a circumscribed; in other cases, the dilated external coat becomes adherent to, and incorporated with the surrounding parts, it is absorbed, and the sac of the aneurism, as it increases, is formed by these parts matted together by the adhesive inflammation. In cases of aneurism thus

produced, there is every reason to believe that the inner coats of the artery have usually been in the state of disease, in which they become thickened and tuberculated, and sometimes ossified, and have in consequence been in a considerable degree deprived of their elasticity and flexibility,—a state in which they are readily broken, and seem to be rendered much less susceptible than in the healthy condition, of taking on the adhesive inflammation. It is perhaps by these circumstances we are to explain why the artery remains pervious, after the laceration, instead of becoming obliterated as in the cases I have related. In some cases of aneurism, however, it has been found that the inferior aperture of the artery communicating with the sac has been obliterated, but it is not possible to determine whether this had taken place at the commencement, or in the progress of the disease. In the first case of obliteration of the arteries I have given, a dilatation of the external coat, resembling a small aneurism filled with a coagulum, was discovered, on dissection, in one of the arteries; but its progress appears to have been stopped by the speedy closure of the artery both above and below the dilatation, by the process of adhesion.

Numerous examples are recorded in pathological and medical works, of obstruction and obliteration of different arterial trunks having been discovered after death. These may, however, have been produced in various ways, besides that to which I have directed the attention of the Society. In

some cases the obliteration has obviously been the result of the pressure of tumours in the arteries; in others of the spontaneous cure of aneurisms which had formed. It may be also produced by the thickening of the internal coats of an artery diminishing its canal.

In many instances in which the external diameter of an artery is not altered, or only slightly increased, we find, on cutting it up, that the inner coats are thickened, sometimes having acquired a more friable and pulpy texture than natural; sometimes being converted into a curdy matter, sometimes cartilaginous, at others with an intermixture of ossific or calcareous deposition.

Dr Abercrombie, in a paper on apoplexy, relates an interesting case of an old woman, in whom the pulse ceased in all the extremities in succession, and for a month previous to her death, could only be felt in the carotid arteries. She was at the same time affected with violent palpitations, and severe dyspnœa. On examination after death, the whole arterial system was found extensively ossified. In some places the tubes of the arteries were considerably diminished by the disease of their coats, and several of the large arteries were obstructed by firm coagula at particular points *. This state of the arteries is most frequently found to exist in a greater or less degree in cases of chronic mortification of the extremities. It generally extends over a consider-

* Edinburgh Medical and Surgical Journal, vol. xv. p. 15.

able portion of the vessels of the affected limb, and not unfrequently over the whole arterial system, and seems to give rise to the gangrene, from the supply of blood being diminished, in consequence of the contraction of the tubes of the arteries, and partly, perhaps, from the interruption it occasions to the healthy functions of the arteries necessary for carrying on the circulation. In a case of chronic gangrene of both feet, in a middle aged man, which occurred in the Infirmary here some years ago, the arteries of the limbs were found universally diseased. In one thigh the vessels, though not increased externally in diameter, were found to have their middle and inner coats thickened to so great a degree, as almost entirely to obliterate the tubes of the vessels. In some parts these coats were soft, easily torn, and separated from each other; in other parts they formed a firm coherent mass, so that when the vessel was cut through transversely, it appeared a solid fleshy cylinder, with a small point in its centre, indicating the remains of the canal, into which it was not possible to pass an ordinary probe. The arteries of the other thigh, and of the legs, were so completely encrusted with osseous matter, as almost to form inflexible bony tubes. The parts illustrating this case are preserved in the Museum of the College of Surgeons.

This alteration of the coats of the arteries may be confined to a small space, and produce there the obstruction of the vessel, and the consequent cessation of the pulse in the limb below. Mr Andral

of Paris mentions a case in which, during life, the pulse of the left wrist was much more feeble than that of the right, and presented frequent irregularities, and, on examination after death, he found, in the interior of the brachial artery, a little above its division, an irregularly rounded tumour, of a cretaceous consistence, which had formed under the inner coat, but had torn this membrane, and obliterated about three-fourths of the canal of the artery *. In cases of this kind, it is obvious that the closure of the artery, and the diminution of the pulse, must be gradual.

Even the trunk of the aorta itself has, in some instances, been obstructed and obliterated; yet the individuals in whom this occurred had survived, and the inferior parts of the body had been nourished, by the anastomosing vessels. These cases illustrate many interesting points in pathology; but, at present, I shall only attend to them in relation to the manner in which the obstruction seems to have been produced. In two of them, a complete obstruction of the canal of the aorta had taken place immediately above its division into the iliac arteries. In one of these, accidentally discovered by Mr Goodesson in a body, the previous history of which was unknown, a considerable portion of the aorta and of the iliac arteries was obliterated, and their canals filled by a firm fleshy substance; and their outer surface adhered firmly to the neighbouring veins, and

* Clinique Medicale, t. i. p. 458.

surrounding parts. The artery above was diseased. It is not easy to determine, from the appearances described, whether the obstruction arose from disease and thickening of the coats of the artery, or was the remains of an aneurism, which had been cured spontaneously, or had been produced by the rupture of the internal coats *. In the other case, which is related by Dr Monro, the obliteration was obviously the consequence of the progress of the spontaneous cure of an aneurism, the tumour of which still remained about the size of a common orange †.

But still more remarkable are those cases of obstruction of the aorta in which it has taken place in the thoracic portion. Three instances have been recorded in which this has occurred immediately beyond the arch of that vessel. In one of these, related by Sir Astley Cooper, a stricture was discovered in this part of the aorta, which, with difficulty, admitted the little finger, and was found to be produced by a thickening of the circular fibrous structure of the vessel, accompanied with some ossification of its coats. In this case, the contraction may be supposed to have arisen from the gradual progress of disease in the coats of the artery ‡. In the other two cases, it is more difficult to assign a cause for the obstruction; and it does not seem possible to explain it by any of the processes which I have noticed as giving rise to the obliteration of arteries. In the

* Dublin Hospital Reports, vol. ii.

† Edinburgh Journal of Medical Science, No. iv. p. 362.

‡ Surgical Essays, Part i. p. 103.

case described by M. Paris, the cylinder of the aorta, for a small space, was contracted to the size of a common quill, so that, when allowance was made for the thickness of the coats, which was not diminished, the canal that remained was exceedingly small. Above and below, the vessel was of its natural size; and M. Paris mentions, that, on the most careful dissection, he could not discover any cause for this extraordinary state *. Dr Graham has given a very interesting account of a case of this contraction of the thoracic aorta, which occurred in a boy of fourteen years of age, who was under his care. In this instance, the artery was completely impervious, for the space of about a line, the appearance being exactly such as if a ligature had been tied tightly round it. Between the strieture and the branches given off to the head and superior extremities, the aorta was preternaturally contracted, but nearer to the heart it was unusually expanded. Below the stricture it resumed its natural size. The coats were not thickened nor diseased †. In these cases, it is obvious that there was no tumour pressing on the artery, no appearance of remains of aneurism, nor any thickening of the coats, by which to account for the production of the obstruction. Neither can it be supposed that the obstruction was occasioned by the laceration of the internal coats of the vessel, for the appearances were not such as to indicate this; and,

* Journal de Chirurgie. Par M. Desault, tom. ii. p. 107.

† Medico-Chirurgical Transactions, vol. v. p. 287.

besides, it is almost impossible to conceive that the interruption to the passage of the blood could have been produced suddenly, without an immediate or very speedy fatal consequence.

It is true that the abdominal aorta may be suddenly obstructed without any immediate very violent injurious effects, and that the inferior parts of the body may be afterwards supplied with blood. In investigating the effects of the application of ligatures to the larger arteries, Sir A. Cooper, whose active zeal in the study and improvement of surgery has not been abated either by the labours, the gains, nor the gratified ambition, attendant upon having attained the highest place in his profession, made the experiment of tying the abdominal aorta in dogs, and he found that no immediate injurious effects were produced in the functions of the animal, that it maintained its usual health, and that the hinder extremities were freely supplied with blood by anastomosis *. Guided and encouraged by his knowledge of the wonderful resources of nature in compensating for the obstruction of the supply of blood through the ordinary channels in the human body, and by the results of his experiments in the lower animals, he was, some years afterwards, induced to apply a ligature to the abdominal aorta in the human subject, as affording the only hope of safety to a patient who was in immediate danger of perishing from hemorrhage, from a large aneurism of the

* Medico-Chirurgical Transactions, vol. ii. p. 260.

left iliac artery, which had given way. He accordingly performed this operation with the dexterity and coolness for which he is so eminent.

This operation, perhaps the boldest ever undertaken, was unfortunately not successful in saving the patient, yet it did not appear productive of any injurious consequences, or to have any effect in hastening his death. On the contrary, the man lived for forty hours afterwards; the hemorrhage was restrained, and his state for some time seemed considerably improved; the process of closure of the artery had proceeded favourably; and although the aneurismal limb continued insensible, and became cold and livid, the right extremity had recovered its natural temperature, and its sensibility, which had been at first impaired, was returning, indicating the restoration of the circulation in it *.

Although, from the facts just stated, it may be concluded that the abdominal aorta may be suddenly obstructed, and the circulation continued by other channels, yet they can by no means be considered as rendering it probable that the circulation could be abruptly interrupted through the aorta, so near to the heart as the site of the contractions in the cases which have been related, without rapidly producing fatal consequences.

Dr Graham, in his remarks on the case to which I have referred, has expressed an opinion that in it the blood had been but recently diverted from the natu-

* Surgical Essays, part i. p. 114.

ral channel. Notwithstanding the arguments in support of this opinion which he has adduced, I am disposed, from a consideration of the history of this case, and the absence of all appearance of recent disease or change in the contracted part of the artery, to doubt its correctness, and rather to adopt the first impression made on Dr Graham by the inspection of the parts, and by "the limber and healthy appearance of the coats at the stricture," that the affection was connate, or at least that it must have occurred at a very early period of life. He has judiciously directed our notice to the identity in the site of the stricture in the different cases of contraction of the aorta within the thorax which have been observed, "lest after examples should prove a peculiar tendency towards its formation in this portion of the vessel, definite portions of continuous and similar structure being, in many instances, liable to particular diseases." An attention to this circumstance may, it appears to me, perhaps throw some light on the origin of these obstructions. In all the cases, it is remarkable that the stricture was situated exactly in that part of the aorta into which the ductus arteriosus enters; and it may be conceived that a similar tendency to obliteration to that which exists in this vessel, from a peculiarity of structure, or some cause as yet unknown, may have extended beyond its orifice into the neighbouring portion of the coats of the aorta, and given rise to the contraction of this vessel at the period of birth, or at the same time with that of the ductus arteriosus.

fied, and the ossification extended into the coronary arteries, so as entirely to obliterate their canals for an inch. Mr Adams attributes the symptoms, in this case, with great probability, to diminution of the muscular power of the heart, arising from the deficient supply of blood to its substance, combined with the mechanical obstruction to the passage of the blood into the aorta, occasioned by the ossification of its valves.—*Dublin Hospital Reports*, vol. iv. p. 443.

Explanation of Plate I.

Fig. 1. Represents the humeral, ulnar, and radial arteries of Case I. p. 113, of their natural size.

a a Condensed cellular substance surrounding and adhering to the humeral artery at its division.

b The canal of the artery contracted and obliterated, containing a cylindrical coagulum, which extends upwards in the tube of the vessel for a quarter of an inch.

c The radial artery contracted for more than an inch from its origin, and filled with a coagulum terminating in a delicate conical process.

d The ulnar artery contracted, and containing coagulum at its origin; and below this, its inner coat terminating in a distinct oblique edge.

Fig. II. Represents the femoral, popliteal, tibial, and peroneal arteries of the same Case, about one-half of their natural size.

a The ovoid sac in the course of the femoral artery, formed by a dilatation of its external coat and layers of cellular membrane exterior to it.

b Solid coagulum contained in the sac adhering to its upper part.

c Tube of the artery above the sac, obliterated by adhesion of its internal parietes. Above this obliteration,

d A strong cylindrical coagulum, extending upwards in the tube of the artery for three inches, and terminating by a slender film opposite to the origin of a branch of the superficial femoral artery.

e The popliteal artery below the sac, contracted and filled with coagulum adherent to its surface, terminating in a strong conical clot projecting downwards.

f The internal coats of the artery, terminating in an abrupt edge below the sac.

g A portion of the popliteal artery which remained pervious, with its coats in a natural state, except at

h A small transverse fissure in the internal coats of the artery.

i The lower part of the popliteal artery contracted, and containing coagulum adhering to its inner surface.

k Thin sac in course of artery. The external coat of the artery forming the sac. The internal coats terminating abruptly at its upper and lower parts.

l Anterior tibial artery, arising from the parietes of this sac, the coats of this artery being much thickened.

m The posterior tibial artery below the sac, filled with coagulum terminating in a conical process, a little before the peroneal artery is given off.

n The peroneal artery, thickened immediately above the mortified part of the limb.

o The continuation of this artery; its coats livid and flaccid where it has entered the mortified part of the leg.

Explanation of Plate II.

Fig. I. Represents the lower portion of the humeral artery and its division into the radial and ulnar branches, in Case II. p. 119, of the natural size.

a The cellular membrane matted together, and adhering to the outer surface of the artery a little above its division.

b The humeral artery contracted, and its canal obliterated by adhesion of its parietes.

c Artery above contracted, and containing a coagulum of a laminated structure.

d The internal coats of the artery terminating abruptly below the obliterated part.

Fig. II. Represents the external iliac artery of Case III. p. 136, of about two-thirds of the natural size.

a The inner coats, lacerated, separated from the external coat for about two inches, and coiled up so as to obstruct the canal of the artery.

b and *c* Lacerations of the inner coats, the edges of the flaps projecting into the tube of the artery. The canal of the artery below the origin of the internal iliac was filled by a coagulum of blood.

CASE

OF

ANEURISM OF THE AORTA,

WITH DISEASE OF THE SPINAL CORD.

By Thomas Molison, M. D. Fellow of the Royal College of Surgeons, and one of the Surgeons of the New Town Dispensary.

Stewart, a chairman, æt. 34. Since the middle of January last has complained of frequent uneasiness and pain in both sides, more particularly the left; has also, for three or four months, been troubled with difficulty of breathing, upon any considerable exercise; and lately has had much difficulty in swallowing solids. Since the middle of April he has not been able to carry any considerable load. Yesterday he carried to Newhaven (distance one mile and a half) a bag of about twenty pounds weight, and bathed in the sea whilst warm; he had been in the water about a quarter of an hour, when he became very confused, and on coming out, fell amongst some stones; he then bled profusely at the mouth and nose, and, from that moment, lost all voluntary motion and sensation of his upper extremities. He was taken

up and carried to an adjoining house; was afterwards put into a warm-bath, and, in the evening, was bled at the arm, and blistered on the nape of the neck; but passed a very restless night with frequent shivering fits, which were reported to resemble convulsions.

16th July.—To-day he was brought to town; had vomited fluid and coagulated blood several times since last night, and when I saw him, at 5 P. M., he had just brought up a large quantity of fluid blood, which afterwards coagulated. He answered questions distinctly, although previously he had talked incoherently; he seemed somewhat lethargic; I therefore spoke loud, and repeated my questions until answered. He said that he was sore all over; but added, that the pains were most severe in the head, chest, and bowels. His features were expressive of much anxiety, and he almost constantly tossed about his head and legs, while his arms were cold and motionless, having a death-like pallid appearance. When he moves his extremities, he invariably contracts the muscles of the mouth, as if making some great exertion. I requested him to squeeze my hand; he then threw the muscles of his face into action, and said he squeezed with his whole force, while not a muscle of his arm moved, nor was he sensible there when pinched. Pulse 120; weak at the wrists and ankles, but much stronger proportionally in the carotids, where they could be seen beating at the distance of five or six feet. No palpitation at the heart; breathing natural; heat of the head augmented, but greatly diminished in all

the extremities; considerable thirst; tongue very white; pupil natural; skin dry; complains of passing his urine involuntarily.

8 P. M. Seven or eight ounces of fluid blood have been discharged by the mouth.

11 P. M. Says he is still very unwell, and tosses about his head and legs. On introducing the catheter, he used great force with his legs.

17th, 8 A. M. Has slept none, retains his urine, and passes it voluntarily.

11 A. M. Has passed two very dark bloody alvine evacuations.

9 P. M. Does not move his head and legs so often.

11 P. M. Breathes softly, and seems in a quiet sleep; he received an injection with fifty drops of laudanum two hours ago.

18th, Slept several hours last night; about four o'clock he talked quite rationally; in a few minutes after, hemorrhage occurred at the mouth, and during this he expired.

20th July, 12 noon.—*Dissection.*—The body is rather muscular, with little fat. Heart and lungs natural; some slight adhesions between the pleuræ. An aneurismal tumour, of the size of a small orange, was observed on the left side of the spine, at the upper part of the root of the left lung. It freely communicated with the aorta and œsophagus, opposite to the fourth and fifth vertebres; indeed, in this part, almost the whole caliber of the œsophagus was destroyed. The left side of the bodies of the third, fourth, fifth and sixth vertebres were quite

bare, and absorption had proceeded in many parts to the depth of a third of an inch. The stomach contained a large, firm coagulum of blood, with prolongations of several inches into both œsophagus and duodenum, of which cavities it had taken an exact shape. The colon was greatly distended with air, and was of a deep dark colour, from the blood it contained. The small intestines were natural, with only some dark spots from the same cause.

Having removed the posterior arches of the three inferior cervical and of the whole of the dorsal vertebres, we observed the cellular substance on the outside of the dura mater of a much darker red than usual, and slightly infiltrated with a bloody purulent looking matter. Between the third dorsal vertebre and the sixth, there existed some extravasated blood immediately underneath the dura mater. Above the second dorsal vertebre the cord itself was firm, and appeared perfectly healthy; but below this, it gradually became soft and yellowish; and opposite to the fifth, sixth, seventh, and eighth, its substance assumed both the consistence and colour of thick cream, with no remains of organization. The cord at this part was so carefully inspected, that, if any medullary band had existed amongst the soft matter, it must have been seen. Three or four of the vertebres were in many parts denuded of their soft covering, where they form the anterior bony parietes of the cord: in some parts they were merely rough; in others, the absorption of the osseous matter was considerable. Nowhere was there

any sensible deposition of lymph between the dura mater and arachnoid. The head was not opened; and we had much difficulty in obtaining liberty to open so much of the spine, which was done fifty-eight hours after death.

The treatment was synapisms to the legs, which caused some heat and pain; the head was shaved; and cold water was frequently applied at the request of the patient, who said it relieved the pain. Turpentine and laudanum enemas were likewise employed: two of the former remained twelve hours, but did not seem to assist the evacuation of the dark bloody matter.

We have no hesitation in attributing the disease of the spinal cord to the aneurism; for, although the absorption was most extensive on the anterior surface of the bodies of the vertebres, yet the disease seems to have passed through these spongy parts, and to have shewed itself in the same process of absorption on the posterior surface, although there could be here no pressure from the aneurism, which is generally considered as the cause of the absorption of the osseous matter. It is more than probable that the disease of the spinal cord had existed for some considerable time previous to the bursting of the aneurism, and, of course, that all the sudden serious symptoms were owing to the great loss of blood.

Softening and disorganization of the dorsal portion of the spinal cord are commonly attended with convulsions of the lower extremities, and followed by pa-

ralysis: but still some few cases are on record where this portion of the cord has been found destroyed, and yet no paralysis has supervened. I may mention the case of a gun-shot wound, which occurred in the practice of Desault, where the spinal cord was completely divided opposite to the tenth dorsal vertebre. M. Janson, of Lyons, also mentions a case, where the inferior dorsal portion of the cord was converted into a pulpy matter. Olivier, in his work on the Diseases of the Spinal Cord, records a case of M. Van-de-Keere, where there was extensive caries of the bodies of the dorsal vertebres, with complete absorption of the cord, between the ninth dorsal vertebre and first lumbar. The termination of the superior end was bulbous, whilst that of the inferior was compressed backwards. The colour and consistence of the cord remained unaltered. In Desault's and Van-de-Keere's case, there was not only no paralysis, but perfect sensation remained in the lower extremities until death. From the impossibility of explaining the above cases, M. Andral *junior* is inclined to doubt their accuracy; but if medical men were to draw such inferences, I need scarcely say how injurious it would be to the future improvement of our profession.

Magendie, who is exceedingly ingenious in many of his observations, endeavours to explain the difficulty, by considering the pia mater as one of the organs or conductors of sensation. Dreading that our patient Stewart might have hurt the spine in

his fall on coming out of the water, for he could give no very distinct account how he fell, I carefully felt all the spinous processes, and tapped them firmly with the points of my fingers, but he said he had no pain there, nor ever had. M. Olivier states, that the most constant symptom of this disease is an excessively acute deep seated pain, accompanied with a feeling of burning heat along the spine, greatly exasperated by motion; and adds, that all authors who have written on this disease, with the exception of M. Pinel *junior*, who has mentioned two cases, have noticed this pain in the back. M. Andral * however says, that this pain has been remarked in a very few instances only, and adds, that it still remains for further experience to point out how far this local pain indicates the existence and seat of the inflammation of the cord. Certainly Stewart never complained of this local pain in the spine, not even when he was freely moved.

That general convulsions may have occurred in this case is possible, as the friends declare, that, during the first night after bathing in the sea, his face was frequently twisted to one side, with fixed staring eyes, and that then it required several persons to hold him in bed; but certainly at no time when I saw him did any thing resembling convulsions occur. He frequently threw the muscles of his face

* Dict. de Médecine, tome 18.

into action on turning over his legs, or drawing them up, but this was evidently a voluntary motion; and at no time afterwards were his lower extremities paralysed.

Regarding the paralysis and loss of sensation of the upper extremities, I can give no explanation, nor am I aware of a similar case on record.

CASE

OF

STRANGULATED UMBILICAL HERNIA;

IN WHICH THE OPERATION WAS PERFORMED WITH SUCCESS.

By James Simson, M. D. Fellow of the Royal College of Surgeons, and Surgeon to the New Town Dispensary.

I was requested on Thursday, the 28th of June, to visit Mrs Macqueen, who stated, that she had had no stool since Saturday the 23d, and that she was troubled with occasional vomiting. She also mentioned that there was a swelling over the umbilicus, which gave her considerable pain when pressed, and was attended with a disagreeable feeling of tightness about the region of the navel.

On examining the abdomen, there was found a double tumour; one situated nearly opposite to the umbilicus, of a conical figure, and circular base, and elevated about a couple of inches above the skin; the cicatrix of the umbilicus could not be found, and the skin upon the top of the tumour appeared

paler and thinner than that of the other parts. When examined, it felt irregular and elastic, and gave the sensation as if it contained air. The other tumour was situated on the left side of this one, and appeared connected with it at the base; but it was less elevated, and more extended, measuring about three inches; it felt soft and doughy, was incompressible, and the pain arising from pressure was referable to the base of the first mentioned tumour.

She stated, that she was sixty years of age, and the mother of eight children, the youngest of whom was thirty-three years old; that she had been without any swelling at the umbilicus till about fifteen years ago, when having been obliged to use considerable bodily exertion, a small tumour, about the size of the point of the finger, appeared under the navel; this swelling repeatedly returned, but gave her little trouble, till about two years ago, when it increased much in size, and gave considerable uneasiness, unless immediately reduced. On Saturday the 23d, the swelling came down, and she was obliged to walk some time after, without making any attempt to reduce it, which, when she tried, was unsuccessful. The flat tumour she said appeared first about ten years ago, and she thinks came also from the umbilicus; it has increased gradually since that time, but she does not remember of its ever having disappeared, and it never gave her either pain or uneasiness. The tongue was clean; the thirst moderate; the skin a little warm; and the pulse 72. She had slight tenderness of abdomen on pressure;

and had taken repeated doses of salts without any relief.

Satisfied that this was a case of umbilical hernia, the patient was placed upon the back, with the pelvis and shoulders elevated, and the thighs bent at right angles with the trunk, so as to relax the abdominal muscles. The tumour was grasped with the hand, and pressure made upwards and inwards, but no effect was produced. Cold applications were directed to be applied, and injections to be used.

29th.—Drs John Gardiner, Robert Hamilton, and Molison, saw the patient with me this morning at 10 o'clock; she had got two injections during the night, but they had brought away no fæces; and every thing she had taken had been vomited. The tongue was furred, the sickness and vomiting had become more troublesome, the pain and tenderness of abdomen much increased; the pulse quick and hard; and there was much restlessness and anxiety. We were now anxious to try the effects of the tobacco glyster, bnt the symptoms were so urgent, that it was deemed advisable to resort to the operation without delay; and the appearances that presented themselves during the operation, justified us, I think, in this resolution.

The patient was laid upon her back, with her shoulders a little elevated; the skin was raised between the fingers, and an incision made upon the left side of the conical tumour, extending towards the one on the left side, so that it might be elongated in that direction if found necessary. After

the skin was divided, the sac was found firmly united to the cellular membrane, through which a puncture was made, and a director introduced, upon which the sac was opened for about two inches and a-half; a large piece of omentum immediately protruded, underneath which, and towards the right side, there was found about four inches of intestine, of a brownish colour. At the upper and left part of the sac there was a narrow opening, through which the finger was introduced, for about two inches, and the stricture felt firmly binding the intestine; a probe-pointed bistoury was introduced flat upon the finger, and the stricture freely divided upwards. Several adhesions had taken place between the sac and its contents, which were easily separated; and then a slight attempt was made to return the protrusion, but without effect, which I believe was caused by the swollen state of the intestine, and the narrow opening through which it had to pass. A straight probe-pointed bistoury was now introduced, as far as where the stricture had been, and by raising the handle of the instrument upwards and inwards, the top of the external opening was made perpendicular to that of the internal one; upon which the contents of the sac were easily returned.

The tumour on the left side presented a smooth surface towards the sac which had been opened, and seemed to contain omentum; but so closely connected with the surrounding parts, that it was deemed advisable not to interfere with it, especially as the woman expressed herself completely relieved by the

operation. The wound was secured by a stitch, straps, a graduated compress, and bandage.

9 o'clock P. M.—She had had no vomiting since the operation. The tongue was furred; but the thirst and feverish feeling were less, and the pain of the bowels was considerably diminished. She had got three injections during the day, the last of which brought away some dark-coloured feculent matter, having a very offensive smell.

30th, 9 o'clock A. M.—She had taken an ounce of castor oil during the night at two different times, and had had two large senna injections, which brought away at each time some bad smelled fæces. She had been troubled a good deal with pain, about two inches below the wound, much increased by pressure; she felt hot and feverish, and was troubled occasionally with hiccup.

9 o'clock P. M.—Her pain had been relieved by ten leeches, and she had taken a solution of the tartrate of antimony. She had got an ounce of castor oil and two injections during the day, and at 7 o'clock P. M, about an hour after she got the last injection, a very great discharge of hardened fæces took place, which relieved all the unfavourable symptoms.

July 1st, She had to-day four natural evacuations. She felt comfortable, and had no pain, and took the solution of the tartrate of antimony.

2d, The wound was dressed to-day; almost the whole of which was united by the first intention.

The stitch was removed, and the bowels are kept moderately open.

From this date, she continued to improve till the 10th, when she was seized with an erysipelatous attack of the abdomen, which terminated in part of the parietes sloughing off on the 15th. From this she is now (31st), however, completely recovered.

I have laid this case before the Society, from the belief that similar ones are seldom met with, and that when they do occur, they generally terminate fatally. I have only heard of three cases of strangulated umbilical hernia having been seen in this place, during the course of a great number of years, in all of which death took place. In two of the cases the operation was performed; in the other, it was not. Mr Pott seems to have been very unsuccessful in cases of this kind, for he says, in his works, that the success of operation in umbilical hernia is very rare, and that it should therefore be the last remedy, though he ascribes the failures more generally to the symptoms arising from disorder of the intestinal canal, than from strangulation. And Mr Lawrence, in his work on ruptures, says, that, in the cases which he has seen, the operation has been uniformly fatal.

From strangulated umbilical hernia taking place so seldom in the adult, some surgeons maintain that it never occurs in advanced life, but that the hernia is always ventral, and comes through a small

fissure in the linea alba, beside the navel. Scarpa, however, shews that the appearances of the two species are different, and says that "the umbilical hernia in the infant or adult, has always a round nucleus or pedicle, around which the aponeurotic margin of the umbilical aperture may be felt with the point of the finger. The body of the hernia constantly retains its spherical shape, even when of its greatest size. No puckering of the integuments similar to what is called the cicatrix of the umbilicus, is perceptible on the upper part or side of the tumour, and there is only at one place a portion of the skin, which is observed to be a little paler and thinner than the rest of the skin covering the tumour. On the contrary, the hernia of the linea alba which forms in the vicinity of the umbilical ring, has a neck or pedicle of an oval shape, and the body of the tumour is always of an oval figure. Farther, on examining deeply with the point of the finger around the neck of the hernia of the linea alba, the margin of the fissure of the aponeurosis is felt to be very little or not at all elevated, and if it has formed very near to the umbilical ring, the cicatrix of the integuments of the umbilicus is seen still unchanged and wrinkled on the one or other side of the tumour." If we compare this description with the case we have given, we will recognize in it at once a case of umbilical hernia.

In operating in cases of strangulated umbilical hernia, great caution is necessary in the use of the knife,

from the connection that subsists between the parts; for, in general, the covering of the protrusion is very thin; and, in cases where the disease is of long standing, or where it has acquired a large size, part of the sac is absorbed, which has led some surgeons erroneously to suppose that this species of hernia has no peritoneal covering, because the protrusion comes through the perforation made in the peritoneum of the umbilical cord; but these vessels do not come through the peritoneum, but pass between it and the parietes of the abdomen; and dissection shews us always a complete peritoneal coat behind the navel. On laying open the hernial sac, the omentum first presents itself, and upon turning it aside, the intestine is generally found lying underneath; the gut should be first reduced, and then the omentum will generally follow. In a case of ventral hernia, of which I lately heard, the surgeon found a piece of omentum only, and no intestine; he removed the stricture and returned the protrusion, but the patient died; and upon dissection after death, the omentum was found to have formed a stricture round a piece of gut, which mortified and caused the woman's death.

The symptoms attending strangulated umbilical hernia are generally at first more moderate than either those of inguinal or crural hernia; but when they become urgent, they pass more quickly to a fatal termination; and, therefore, so soon as the various remedies for reduction have received a fair

trial, without success, and the symptoms have become severe, we should immediately resort to the operation; and ever remember the observation of that excellent surgeon, the late Mr Hey of Leeds, who remarked, that he had often, in hernia, had occasion to lament that he had performed the operation too late, but never that he had performed it too soon.

ON

A REMARKABLE ALTERATION

IN THE

STRUCTURE OF THE PATELLA,

PRODUCED APPARENTLY BY THE PRESENCE OF A LOOSE CARTILAGE WITHIN THE CAVITY OF THE KNEE-JOINT.

By Robert Knox, M. D. F. R. S. E., Lecturer on Anatomy, Fellow of the Royal College of Surgeons, and Conservator of their Museums.

THE diseased knee-joints, of which I am about to give an account, occurred in my Rooms for Practical Anatomy, and were therefore taken from a subject, of whose history we could learn nothing. But, as the appearances are such as I have not met with, or read of any where, and seem to constitute a new feature in the disease, I fancied that a brief description of the preparations, together with their exhibition, might be interesting to the Society.

A female subject, seemingly about thirty years of age, was brought into the dissecting-rooms; she had

been in good condition at the time of death, and there was nothing, indeed, remarkable to be observed, excepting, as I have been assured by a most intelligent assistant, Mr Jones, the limbs could not be fully extended, but remained constantly slightly bent. In the progress of the dissection, the knee-joint was opened, and, when carefully examined, presented the following appearances.

1*st*, In the left knee-joint, which I am now describing, there existed a loose cartilaginous body, of the size represented in Plate III. fig. 1. and apparently of the same nature with those so often described by authors who have detailed cases of this remarkable disease. It was firmly impacted, immediately behind the internal condyle of the femur, in a situation from which it could not easily have moved, and where it seemed to have been for a considerable length of time. I form this conjecture, partly from the remarkable manner in which it was bound down in its situation by the synovial capsule, (see *a* fig. 2), and partly from the alteration produced in the articular cartilage encrusting the femur, which had entirely changed its appearance, had become rough, villous and soft, and, indeed, to a certain extent, had disappeared. The articular surface of the femur, on which the patella usually plays (*a* fig. 3.), had been also affected; its form is somewhat changed; both condyles superiorly slightly overlap the femur, as if there had existed a commencement of an exostosis, which, to a certain degree, may be said to be present;

the smooth exterior surface of the external condyle is undergoing a change into an ivory-looking substance,—a change which the extremities of bones undergo under a variety of circumstances; on this surface, also, the cartilage of incrustation was scarcely perceptible.

2*d*, Near the insertion of the anterior crucial ligaments, and behind the semilunar cartilages, there is a small exostosis or growth of bone arising from, or connected with, the tibia.

3*d*, But the patella (*b* fig. 3.) has undergone the most remarkable change.

Developed, apparently, in the tendon of the extensor, and surmounting the upper margin of the patella, there is an additional bone, (*c* fig. 3.) as if a second patella. The remaining portions are three; a large central portion, corresponding to the regular patella, whose inner or articular surface is evidently undergoing the same change as that surface of the femur on which it must chiefly have played, namely, the outer condyle: and on the margins of this patella, viz. on the internal and inferior, but, at the same time, somewhat external margins, there are two additional portions of bone, of considerable magnitude, organised, apparently, altogether as the original patella, and performing similar functions.

The preparation, which is now before the Society, might easily have been taken by any one for a specimen of fractured patella, were it not for two circumstances; the presence of loose cartilage in the

joint: and the fact, that the other knee of the same subject presents altogether the same appearances, so that, whatever I have said of the left knee, is strictly applicable to the right, and *vice versa*.

I do not remember ever to have seen a pathological specimen, such as is now exhibited to the Society, nor do I remember to have read of such; but, as my avocations do not permit me to make the necessary strict inquiry into the records of pathology, I have brought the subject before the Society, expressly to elicit thereon the opinion of my fellow members.

In the extensive museum entrusted to my charge by the Royal College of Surgeons, there is a preparation exhibiting a loose cartilage in the joint altogether like the cartilaginous bodies now before us, and a commencement of that change on the margin of the condyle, which I have described as an overlapping of the shaft of the bone by a projection of condyle; but the patella has not undergone any change; still I am inclined to think, that nearly all the pathological appearances I have described were produced by the loose cartilage, and by the circumstance of its being impacted in the upper and back part of the joint, so as to prevent the proper extension of the limb.

Explanation of Plate III.

Fig. 1. One of the loose cartilaginous bodies, natural size; it had no connection whatever with the surrounding parts.

Fig. 2. View of the left knee-joint, seen from behind.

a, Marks the situation of the loose cartilage resting on the upper part of the inner condyle of the femur; it was firmly bound down in its place by means of the synovial capsule.

b, Popliteal surface of the femur.

c, Internal condyle of the same bone.

d, Posterior surface of the tibia.

e, Head of the fibula.

Fig. 3. Presents a front view of the knee-joint. The patella is hanging down on the fore-part of the tibia, connected to the bone by its usual ligament or tendon. The articular surface of the patella is, of course, that which is seen in the drawing; *a* marks the surface of the femur on which the rotula usually plays.

CASE

OF

DISEASE OF THE HEART.

By J. H. Wishart, F. R. S. E., Surgeon to the King in Scotland.

Mrs Edmonston, æt. 28, March 28, 1827, is affected with palpitation of the heart of several years' standing: the pulsation is very irregular and intermitting; it is not confined to the natural situation between the sixth and seventh ribs, but it may be felt nearly as high as the clavicle on the left side of the sternum. The beat is so strong, that it is often heard by her attendants; and, on approaching the ear, the sound is very loud. She has a constant, severe tickling cough, with great anxiety and hurried breathing; the jugular veins have a distinct undulatory motion. The pulse at the wrist is so feeble and irregular, that it can scarcely be numbered. Her chest is very much emaciated, and the mammæ shrunk. The lower extremities are œde-

matous; the swelling extends up to the pelvis, and there appears also to be slight effusion in the abdomen, but no fluctuation. Urine very scanty and high coloured; bowels open; appetite natural; considerable thirst.

This complaint of the heart is of about seven years' duration: she has during that time been unable to walk quick, or up stairs, without violent palpitation being brought on. She was always aware of it herself, and, of late, her sister, who used to sleep with her, was sensible of the sound produced by the beating of the heart. It has increased considerably within these nine months, since she was married, and has had more to do in going about in the management of her house. The dropsical swellings have supervened within these six weeks.

On visiting this patient, after clearing out the bowels, I directed her to take pills of a grain of squills, and half a grain of calomel, night and morning; to use the nitrous æther in juniper tea, acidulated with cream of tartar, as her ordinary drink. I was very desirous of trying the effect of small bleedings from the arm; but on its being hinted at to her, I found that both the patient and her friends had imbibed a prejudice against bleeding, in consequence of its having been once tried with no benefit. The case was now too far advanced to expect any thing from it except temporary relief, and, on that account, I did not urge its use.

In the course of a few days, I found, in addition to the other symptoms, that her whole body was

tinged of a yellow colour. I examined the right side; but although there seemed some firmness, I could not perceive any enlargement of the liver. The medicines had had the effect of increasing the quantity of urine, but had procured no relief to the pectoral symptoms; the cough was very distressing. The digitalis was ordered, in addition to the former prescriptions, and small doses of an opiate were directed for the cough.

There was, from this time, a very rapid aggravation of all the symptoms. The œdema of the lower extremities increased to a great degree; the surface of the skin was shining, and at the sides of the thighs and on the fore part of the legs, there was a reddish brown mottled appearance, as if blood had been effused. The yellowness of the whole body increased to a greater pitch than I had ever seen it. For two days previous to her death, she seemed unable to cough; she lay in a continual slumber, the pulsations of the heart became sensibly feebler, and she expired on the 18th April.

Dissection.—The skin of the whole body was tinged of a deep yellow colour; the lower extremities œdematous, and nearly double their natural size. On opening the thorax, the pericardium and heart occupied the space between the second and the seventh or eighth rib on the left side, but inclined more to the right than usual; the lungs were healthy; about twelve ounces of serum were contained in the cavities, rather more in the left than

in the right. The pericardium contained six ounces of fluid of a deeper yellow colour than natural. The heart, also, was tinged of a yellow colour; it was a little enlarged in size. The right ventricle was occupied by a polypous concretion, extending into the auricle, which it filled so completely, as must have been a great impediment to the circulation from the veins into the auricle, and from the auricle into the ventricle. The polypus concretion adhered to the columnæ carneæ of the ventricle; it extended, also, for a very short space, into the pulmonary artery. On laying open the left ventricle, its walls were rather stronger than usual, but the difference was slight; its cavity was small, and contained very little blood. The mitral valves were cartilaginous, and the orifice so contracted, as scarcely to admit the point of the little finger. The opening of the aorta appeared at first sight completely closed; a caruncular excrescence, with fringed edges, projected into the ventricle. On examining it, it was found to originate on the aortal aspect of the valves, and passed through them into the heart; it filled up the space, so as scarcely to leave an opening sufficient to admit a split almond. The left auricle was much distended, and filled with a fleshy concretion mixed with blood, but of a quite different appearance from that in the right cavities of the heart, resembling the concretions that are frequently met with in aneurismal sacs. The two venæ cavæ were larger than natural.

About a pound and a half of very dark coloured

serum was contained in the cavity of the abdomen. The omentum was of a dark colour: it did not extend, as usual, over the surface of the intestines, but was shrivelled up at the upper part. The right lobe of the liver was enlarged; very firm in its texture, and its surface covered with small white tubercles of the size of a pea. On cutting into it, similar tubercles were distributed through it. The gall bladder was of a whitish colour: it was quite collapsed, and did not contain more than a tea-spoonful of greenish bile. The duct leading into the duodenum was impervious, and did not admit the point of a small probe.

The pulsation of the jugular veins has been considered as a diagnostic mark of the dilatations of the right cavities of the heart. In some cases, the pulsation has also been observed to be communicated to the veins of the arm to such a degree, that it was difficult to distinguish them from the arteries. In these cases, the retrocession of the blood by the superior cava, seems entirely ascribable to the quantity of blood that has penetrated into the right ventricle, being greater than can be received by the pulmonary artery, there being also some defect in the corresponding ventriculo-auricular orifice. The contraction of the ventricle which projects the blood into the lungs, sends back a portion of it again into the auricle through which it has just passed, the blood

returning again into the jugular veins, and meeting that which was flowing towards the heart, suddenly distends them. In this case, the inversion of the course of the blood was not owing to dilatation, but to the obstruction caused by the polypous concretion passing from the auricle into the ventricle, and the beginning of the pulmonary artery.

Diseases of the valves are among the most common affections of the heart, and occur as frequently as enlargement of its cavities. These affections are very often combined together. They occur most frequently in the left side of the heart, and, perhaps, more generally in the mitral valves; very often in the semilunar valves of the aorta, and are much rarer in the right side of the heart. Various are the forms which the valves assume in their changes. The venous, or mitral valves, frequently adhere to each other, and leave only a narrow fissure, or small hole, for the passage of the blood; or they are torn, rolled up, and compressed against the walls of the cavities, they are in various degrees of stiffness and induration, with swellings or irregularities on their surface. The arterial valves assume, also, a variety of forms; they adhere readily at their indurated edges, or an induration forms at their base, which unites with a bony ring; or they are separated into several portions, which contract and form irregular swellings; or they become rigid, and form a firm mass which prevents the flow of the blood from the heart.

The effect of these changes is a greater or smaller

obstruction to the flow of the blood, and this may be either uniform and continued, or irregular and intermitting. The latter is produced by the soft excrescences, and such indurations of the valves as allow a certain degree of motion.

The symptoms characterizing contraction of the openings of the heart are the same as denote every disease of that organ; such as anxiety, palpitations, faintings, &c.; but these symptoms are more strongly marked. In the state of rest, the patients often feel a slight, but always a certain, degree of contraction about the heart, marked by a superficial and unequal degree of difficulty of breathing; but as the disease increases, this becomes constant and often violent. The motion of the heart is sometimes, though rarely, regular, and corresponds with the pulse; but on the slightest motion it becomes in a moment irregular, and the pulse also varies from its previous correspondence with the pulsation of the heart. It becomes unusually quick, without necessarily becoming irregular; or when it does become irregular, its irregularity is different from that of the heart. The breathing becomes more affected, in proportion to the disturbance of the activity of the heart, and there is often a threatening of suffocation. Farther, these symptoms are accompanied with paleness and blueness of the countenance and of other parts; frequent bleeding from the nose, startings in the sleep, and fainting fits.

In many cases we observe a whizzing of the heart, such as always takes place when the blood passes

through a narrow aperture; but this appears more especially to take place when, in consequence of the imperfect closure of the opening of the heart, a part of the wave of the blood is driven back through it. In contractions of the apertures of the heart, we find almost all the marks of other affections of the heart conjoined; they gradually supervene, such as œdematous swellings of the extremities: all the symptoms increase in the progress of the complaint, especially the want of correspondence of the beating of the heart with the pulse at the wrist, and the irregularity of both; as well as the sudden change from a state of comparative ease to that of urgent symptoms of suffocation.

EDINBURGH,
July 1827.

A very short time after the preceding case was read to the society, I stated at one of the meetings, that I had a case under my care which presented so precisely the same train of symptoms as the preceding, that I mentioned at the time that I had reason to anticipate the same morbid appearances, that is, the contraction of the semilunar and mitral valves. The symptoms particularly presenting, were the undulations of the jugular veins to a very great degree; indeed it appeared as if there was the motion of *boiling* in the neck on both sides. The respiration was more difficult than in the former case; the patient could only breathe with her head leaning

forward between her knees. There was great irregularity in the action of the heart; it generally intermitted every fourth beat, but the action was not so much increased in force. The pulse at the wrist was so feeble and irregular that it never could be counted. The patient had always been of a very sallow unhealthy complexion, but it had been ascribed to some affection of the abdominal viscera: she was frequently distressed with sickness and vomiting. The symptoms of affection of the heart had never been observed in any previous illness.

The usual medicines were tried without avail; œdema rapidly supervened, and she expired on the 17th September, about ten weeks from the commencement of her disease.

The body was opened in presence of Dr Knox. It was œdematous to a very great degree; twenty-five ounces of serous fluid were found in each cavity of the thorax, and about ten ounces in the pericardium.

The heart was generally more muscular than usual, more especially the left auricle. The left auriculo-ventricular orifice was greatly contracted, in consequence of a thickened cartilaginous state of the mitral valve. The aortal valves were in a similar state, permanently thickened and cartilaginous; and the opening into the vessel scarcely admitted the little finger. It seemed even as if this state was about to extend to the right side of the heart; for the tricuspid valve was beginning to partake of this

thickening, and the pulmonary semilunar valves were stronger than usual.

One kidney presented the appearance of that disease by which this organ is ultimately converted into a number of sacs communicating one with another.

Both preparations have been deposited in the Museum of the Royal College of Surgeons of Edinburgh.

OBSERVATIONS

ON THE

CAUSES OF THE SOUNDS

PRODUCED BY THE ACTION OF THE HEART.

By John William Turner, Professor of Surgery to the Royal College of Surgeons, &c.

If the ear be applied to the chest in the region of the heart, either directly or through the medium of the stethoscope, there are perceived, for each pulsation of the arteries, two sounds or beats following each other in immediate succession, and then a short interval is observed, during which no action or motion of the heart is perceptible; and, after this, the two consecutive sounds are again heard.

In many cases, if the hand be applied to the left side of the thorax, two succussions are felt in immediate succession, followed by an interval of rest; the succussions corresponding with the sounds described as heard by the ear. It is not, in all instances, possible to feel two distinct succussions. In many indi-

viduals one only can be felt, and in some, under certain circumstances, the pulsation of the heart cannot be discovered at all by the hand applied to the thorax. In children, the double beat or succussion can, in general, be distinctly perceived by the hand, especially if the action of the heart be unusually increased. I have often felt it in young persons after the age of puberty, particularly when the functions of the stomach have been deranged, and this derangement has been accompanied with a tendency to palpitation. In adults, the second succussion is more rarely felt; but I have not unfrequently perceived it, more particularly in individuals with small thin chests, and in those affected with dyspeptic and hypochondriacal or nervous ailments. In some instances in which the double succussion could not be perceived, when the persons examined were in the erect posture or lying on the back, it became observable by making them lie on the left side; and in all cases it has appeared to me to be rendered more distinct in this position of the body. Some individuals, in certain states, are themselves sensible of the double succussion by the sensation it produces in the chest, and which it communicates to the ear when the head is laid on the pillow.

This description of the double stroke or succussion which is felt in the region of the heart, applies to cases in which there has not appeared any reason to believe that disease of that organ existed. The double stroke occurs also in organic diseases of the heart; but I cannot recollect to have observed it

more forcible or distinct in any cases of these diseases, than in cases in which there has been every reason to believe the heart to be sound.

One of the most remarkable examples of the sensation communicated to the hand by the double beat, which has fallen under my observation, was in a boy about fourteen years of age, who had just passed through the eruption of measles. He continued to labour under an affection of the chest. His pulse, however, was not quick, and was quite regular; but for each pulsation of the artery at the wrist, two distinct pulsations could be felt by the hand placed on the breast. The pulse afterwards suddenly rose to twice its former number, and the double beat of the heart could then be no longer felt. The symptoms of acute phthisis supervened, and rapidly proved fatal. On examination of the body after death, the heart was found to be sound; but there were several lymphatic glands enlarged to a considerable size, situated on the outer surface of the pericardium, near the basis of the heart and roots of the great vessels. The lungs were filled with tubercles, many of which had passed into the state of suppuration.

The two sounds and succussions communicated by the heart, have been considered and described as indicating the successive contractions of the ventricles and auricles. I have long felt doubtful as to the accuracy of this opinion, and have become satisfied, for reasons which I shall state, that it is erroneous.

The late M. Lænnec has given a very precise account of the sensations which are communicated by the action of the heart to the hand applied externally, and more particularly to the ear through the medium of the stethoscope. I shall direct my observations to this account, since it may justly be regarded of the greater value, that the description contained in it is given by one who was eminently distinguished for his powers and habits of minute and accurate observation; and who, from his attention having been particularly turned to the subject, and his having enjoyed most extensive opportunities of investigating it, had examined the actions of the heart in its healthy and morbid states, probably much more frequently than ever has been done by any other individual.

In describing the rhythm of the pulsations of the heart in its natural condition, as ascertained by the stethoscope, M. Lænnec states,—"At the moment the artery strikes the finger, the ear is slightly raised by a motion of the heart synchronous with that of the artery, and accompanied by a sound somewhat dull but distinct. The synchronism does not permit us to doubt that the phenomenon is owing to the contraction of the ventricles. *Immediately after, and without any interval,* a sound, more sharp and analogous to that of a valve which is raised, the crack of a whip, or the lapping of a dog, announces the contraction of the auricles." He adds, "No motion sensible to the ear accompanies this sound; *no interval* separates it from the

duller noise accompanied by the raising of the ear, that indicates the contraction of the ventricles, which it seems to limit and to interrupt suddenly." "Immediately after the systole of the auricles, there is an interval of repose, very short, but well marked; after which, the ventricles are again perceived to raise themselves with the dull sound and gradual progression which are peculiar to them; the sudden and more sonorous contraction of the auricles follows, and the heart again falls for an instant into an absolute immobility *." M. Lænnec also estimates the respective duration of the different states of the heart; and, according to his observation, one-half of the period of the action of the

* "Au moment où l'artère vient frapper le doigt, l'oreille est legèrement soulevée par un mouvement du cœur isochrone à celui de l'artère, et accompagné d'un bruit un peu sourd quoique distinct. L'isochronisme ne permet pas de meconnaitre que le phénomène est du à la contraction des ventricules.

"Immédiatement après, et sans aucun intervalle, un bruit plus éclatant et analogue à celui d'une soupape qui se relêve, d'un fouet, ou d'un chien qui lape, annonce la contraction des oreillettes."

"Aucun mouvement sensible à l'oreille n'accompagne ce bruit, aucun intervalle de repos ne le sépare du bruit plus sourd et accompagné de soulèvement indicateur de la contraction des ventricules qu'il semble borner et interrompre brusquement."

"Immédiatement après la systole des oreillettes, il y a un intervalle de repos très court, mais cependant bien marqué, après lequel on sent les ventricules se soulever de nouveau avec le bruit sourd et la progression graduelle que leur sont propres; suit la contraction brusque et sonore des oreillettes, et le cœur retombe encore pour un instant dans une immobilité absolue." Traité de l'Auscultation Mediate, tom. ii. p. 404 & 405.

heart is occupied by the contraction of the ventricles, a fourth by that of the auricles, and a fourth by the state of repose. When the pulse was slow and sudden, he found the interval of repose proportionally longer and more sensible than in ordinary cases. In one instance, in which the pulse beat forty times in a minute, the period of repose seemed to him to equal the time occupied by the successive contractions of the ventricles and auricles *.

The accuracy of this description of the sensations of sound and impulse communicated through the stethoscope by the action of the heart, will at once be recognized by all who have examined it in this way, and their analogy to those ascertained by the application of the hand to the chest, is very remarkable. On feeling the action of the heart with the hand, however, a distinct motion is perceived on the second of the consecutive succussions. It is generally felt as if at some distance from the surface, and situated towards the base of the heart; an impression which is described by Lænnec to be occasionally communicated by the sound given through the stethoscope †. This second succussion does not usually communicate the feeling as if any thing struck the inner surface of the parietes of the thorax, especially if the individual examined be laid on the back, or placed in the erect position; but, in some instances, where the individual has been laid on the left side, or turned to-

* Traité de l'Auscultation Mediate, tom. ii. p. 407.

† Ibid. p. 395.

wards the face, I have observed a distinct impulsion against the parietes of the chest, towards the upper part of the præcordial region.

Although there can be no doubt that the sensations communicated by the actions of the heart are most accurately described by M. Lænnec, yet I suspect that the explanation he has given of these sensations is incorrect. That the first of the two consecutive sounds or sensations of motion is connected with the contraction of the ventricle, is obvious, from its being synchronous with the pulse in the arteries, and also from the apex of the heart being felt, during it, to strike against the ribs. But that the second of the sensations is communicated by the contraction of the auricles, I conceive not to be proved by any thing which has been observed, and to be inconsistent with the nature of the action of the heart, as ascertained by physiologists from the inspection of that organ, in living animals.

In the circulation of the blood, as described by physiologists, this fluid is returned by the veins into the auricles of the heart; the auricles contract, so as to propel the blood into the ventricles, and immediately after this the ventricles contract, producing the stroke of the apex of the heart against the parietes of the thorax and the pulse in the arteries. These motions constitute the systole of the heart. Immediately after the contraction of the ventricles, the heart falls into a state of repose for a time, constituting its diastole. After the diastole, the auricles again contract, and the same series of phenomena is observed to be re-

peated. Now the succession of the actions of the heart, as inferred by Lænnec from the sensations communicated to the ear, does not correspond with this account given of them by physiologists. According to the description I have quoted from Lænnec, the contraction of the ventricles is made the first of the two consecutive motions; the contraction of the auricles is supposed to follow it instantly without any interval; and the quiescence or diastole to take place on the termination of the contraction of the auricles. On the contrary, according to the observations of preceding physiologists, the contraction of the auricle is the first of the two consecutive contractions; that of the ventricle follows it immediately, and the diastole of the heart takes place between the termination of the contraction of the ventricles aud the commencement of that of the auricles.

That this description of the successive motions of the heart, and of the order in which they occur, is not given on vague grounds, may be proved by the writings of various physiologists who have investigated this subject.

Harvey, in treating of the functions of the heart, has, from the extensive series of observations which he had made, described the order of its motions with all the clearness and precision by which his work on the Circulation of the Blood is so pre-eminently distinguished. He states, "there are as if two motions at the same time,—one of the auricles, the other of the ventricles themselves; nor are these performed altogether simultaneously, but the motion

of the auricles occurs first, and that of the *heart* follows, and the motion is seen to begin with the auricles and to proceed to the ventricles*." He also says, "It is to be noted, that what I call pulsations in the auricles and in the *heart*, are contractions; and you will distinctly see the auricles to be contracted first, and afterwards the *heart* itself†." And he afterwards states, "In the first place, the auricle contracts itself, and, in that contraction, it throws the blood contained in it into the ventricle, which being filled, the *heart* is excited immediately, braces all its nerves, contracts the ventricles, and produces the pulse in which it impels into the arteries the blood sent from the auricle ‡."

Senac, in treating of the motion of the heart, says, "If we appeal to the testimony of the eyes, we shall certainly see that the contractions of the venæ ca-

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* "Duo sunt quasi eodem tempore motus, unus auricularum, alter ipsorum ventriculorum: nec enim simul omnino fiunt: sed præcedit motus auricularum, et subsequitur *cordis* *, et motus ab auriculis incipere, et in ventriculos progredi visus est." De Motu Cordis, Lugduni Batavorum, 1737, p. 31.

† "Notandum est ubique omnes, quas voco, et in auriculis, et in corde pulsationes, contractiones esse: et plane primo contrahi auriculas videbis, et in consequentia, cor ipsum." Ibid. p. 32.

‡ "Primum sese contrahit auricula et in illa contractione sanguinem contentum in ventriculum cordis conjicit, quo repleto cor sese erigit, continuo omnes nervos tendit, contrahit ventriculos, et pulsum facit, quo pulsu immissum ab auricula sanguinem continenter protrudit in arterias," &c. Ibid. p. 37.

* Harvey, and also Haller, seem frequently to use the word *cor* to signify the ventricles of the heart. It is here employed in this sense.

væ and the auricles; of the auricles and the ventricles; of the ventricles and great arteries, succeed each other exactly *." And in another place he states, "These contractions of the auricles are the first motions of the heart; when they contract, the ventricles are dilated, and contract themselves immediately after; that is to say, the dilatations and contractions are successive in these organs †."

According to the description of Haller: "After the contraction of the auricles,—in warm blooded and vigorous animals, very quickly; in the cold blooded and languid, somewhat more slowly; and in warm blooded animals, sometimes with a short interval sufficiently well marked,—the contraction of the ventricles follows. It follows, I say; because I have seen this in very many experiments in the cat, the dog, the dormouse, and very easily in the chick in ovo; and because most dissectors of the preceding age habituated to the examination of living animals, bear testimony that the motion of the ventricles follows that of the auricles, and have confirmed by their experiments the alternate contraction of

* "Si on en appelle au témoignage des yeux, on verra certainement que les contractions des veines caves et des oreillettes; des oreillettes et des ventricules; des ventricules et des grandes artères, se succedent exactement," &c. Traité de la Structure du Cœur, &c. 2de ed. à Paris, 1783, tom. ii. p. 32.

† "Ces mouvemens des oreillettes sont les premiers mouvemens du cœur; quand elles se contractent, les ventricules se dilatent et se resserrent ensuite; c'est à dire que les dilatations et les contractions sont successives dans ces organes;" &c. Ibid. p, 35.

the auricles and ventricles *." In another place he says, "It may now be understood, why the auricles first, and the ventricles afterwards, are contracted †;" and, again, "A reason is required why, first, the right auricle, and, at the same time, the left are contracted, while, in the mean time, the ventricles rest relaxed; why, a little after, the auricles are relaxed, but both ventricles contract themselves; and then, in the third place, the ventricles repose relaxed, but the auricles again contract with a quick impulse ‡." In describing the diastole of the heart, Haller states, "then the same heart, after the contraction is completed, passes

* "Post auricularum constrictionem celerrime in calido et sano animale, aliquanto lentius in frigido, et languente, et nonnunquam satis magno etiam in calidis, tempusculo interposito, sequitur ventriculorum contractio; sequitur inquam cum in plurimis experimentis ita viderim, in fele, cane, glire, facillime vero in pullo incubato; et cum plerique prioris ævi præsectores, in vivorum animalium incisionibus innutriti, motum ventriculorum auricularum constrictionem sequi testes se offerant alternasque auricularum et ventriculorum contractiones suo experimento confirmaverint." Elementa Physiologiæ, Lausannæ, 1757, tom. i. p. 417.

† "Denique, incipit intelligi, quod continuo in quæstionem vocabimus: quare nempe priores auriculæ, et posteriores ab eo tempusculo ventriculi constringantur." Ibid. p. 497.

‡ "Poscitur ratio, quare prima dextra auricula, et una, eodemque tempusculo, etiam sinistra contrahatur, dum interim ventriculi laxi quiescunt; quare paulo post auriculæ laxatæ resolvantur, ambo vero ventriculi se constringant, et denuo tertio tempusculo ventriculi quidem remissi otientur, auriculæ vero denuo vivida vi se arctent.' Ibid. p. 498.

into that state which we denominate dilatation, remission, or the diastole," &c. *

I shall only add the description given by M. Magendie. He has not entered at all minutely into the consideration of the order in which the motions of the heart succeed each other; but what he has said of the relation of the contraction of the auricles to that of the ventricles, is sufficiently precise. He states, "The instant when the auricle ceases to contract is that at which the ventricle begins to act †."

So closely does the contraction of the ventricles follow that of the auricles, that it is difficult, in many cases, exactly to ascertain the termination of the one and the commencement of the other. In cold blooded animals, in the pulsation of the heart when first formed in the embryo of the chick, and in warm blooded animals, when the action of the heart exposed to view becomes languid, they can be observed distinct from one another; but in warm blooded animals, when the action of the heart is vigorous, it is difficult by the eye to distinguish any limit between the termination of the contraction of the auricle and the commencement of that of the ventricle. In these animals, so rapidly do the contractions follow

* "Deinde, idem cor, post absolutam contractionem, in statum transit, quem dilatationem, remissionem aut diastolem dicimus." Elementa Physiologiæ, Lausaunæ, 1757, tom. p. 386.

† "L'instant où l'oreillette cesse de resserrer est celui où le ventricule entre en contraction," &c. Précis Elémentaire de Physiologie, Ed. 2. tom. ii. p. 290.

each other, that Harvey has described them from their commencement in the auricles to their termination in the ventricles, as often, apparently, forming one continuous motion. "These two motions," he says, "one of the auricles the other of the ventricles, are so performed in succession, guided as if by a harmony and rhythm, that both take place together; only one motion is apparent, especially in warm blooded animals, when the parts are agitated with a quick motion *." "And if any one will attend carefully to the motion of the heart exposed in the living animal, he will see not only, as I have said, the *heart* to raise itself, and to make one motion continuous with that of the auricles, but also an undulation, and an obscure lateral inclination towards the duct of the right ventricle, and the organ to twist itself slightly, as it were, and thus to perform this action †." He compares the succession of the contractions to the motion of

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* "Isti duo motus, auricularum unus, alter ventriculorum ita per consecutionem fiunt, servata quasi harmonia et rhythmo, et ambo simul fiant, unicus tantum motus appareat, præsertim in calidioribus animalibus, dum illa celeri agitantur motu." De Motu Cordis, p. 37.

† "Et si quis cordis motum diligenter in viva dissectione animadverterit videbit, non solum, quod dixi, cor sese erigere, et motum unum fieri cum auriculis continuum, sed inundationem quandam, et lateralem inclinationem obscuram, secundum ductum ventriculi dextri, et quasi sese leviter contorquere et hoc opus peragere," &c. Ibid. p. 38.

one wheel driven by another; to the ignition of the powder and discharge of a gun by the stroke of the flint impelled by the lock; and to the action of deglutition: in all which, he remarks, there are a number of motions, but following each other in such rapid succession, that their limits cannot be distinguished, and they appear as if they constituted one continued action.

Indeed, so difficult is it to observe the limit between the contractions of the auricles and of the ventricles, that they have been sometimes believed by diligent observers to be, to a certain extent, simultaneous or synchronous with each other. This was the opinion of Lancisi, who appears to have investigated the actions of the heart very carefully by experiment, and to have been well aware of the sources of fallacy in making observations on this subject. He observes, that, in order to see the motions of the heart as nearly as possible in their natural state, it is necessary to select large animals, such as oxen, horses, or, at least, large dogs healthy and vigorous; and to examine the heart immediately on opening them. In such animals, he says "it may be established by experiment, that the contraction of the auricles is not performed alternately with that of the ventricles, but that the former anticipates the latter a little *." He divides the time oc-

* "Non dubitamus asserere, in natis, atque adultis animalibus experientiâ quoque constare, ipsas auricularum contractiones non quidem vicissim cum ventriculis fieri; sed illas horum systolem

cupied by the contraction, and that occupied by the relaxation of the heart, into three parts—the beginning, the middle, and the end; and thus describes the relation of the motions of the auricles and of the ventricles to each other. "The whole operation of contraction and relaxation is so performed, that the beginning of the systole of the auricles is synchronous with the end of the diastole of the ventricles; the middle of the systole of the auricles is synchronous with the beginning of the systole of the ventricles; and, finally, the end of the systole of the auricles coincides with the middle of the systole of the ventricles: and, *vice versa*, it will be found, that the end of the contraction of the ventricles corresponds with the beginning of the diastole of the auricles; the beginning of the diastole of the ventricles with the middle of the diastole of the auricles; the middle of the diastole of the ventricles with the end of the diastole of the auricles; and that the end of the diastole of the ventricles, as we have said, coincides with the beginning of the systole of the auricles *." He also

parumper antevertere." De Motu Cordis et Aneurismatibus, Lugduni Batavorum, 1740, Prop. lix. p. 192.

* "Universum siquidem, et contractionis et remissionis negotium eâ lege transigitur, ut principium systoles auricularum synchronum sit, cum fine diastoles ventriculorum; medium verò systoles earundem auricularum sit synchronum cum principio systoles ventriculorum; denique, ut finis systoles auricularum metiatur medium contractionis ventriculorum; et vice versa comperiet,

states that in the chick in ovo, during the first days of incubation (from the third to the sixth day) the motions of the rudiments of the auricle of the heart can be observed to alternate with those of the rudiments of the ventricle; but that after these two parts join each other, and the heart acquires a conical form, these motions appear continuous rather than alternate; for the contractions of the whole *corculum* then begin in the auricles, and terminate in the ventricles; but we do not see them at all to follow each other *. This opinion of Lancisi's has been discussed by Senac and Haller, who object to it, not exactly by denying his observations, but by adducing those made on cold blooded and smaller animals, in which they say the motions of the auricles and the ventricles can be seen distinct from each other; and combat it by arguments, to my mind, not very conclusive, some of which, I may observe, were not unknown to Lancisi himself, who has endeavoured to refute them †. Senac, however, allows that it may be suspected that the last efforts of the auricles are synchronous with the first efforts of the ventricles when they contract ‡.

finem contractionis ventriculorum concurrere cum principio diastoles auricularum: principium autem diastoles ventriculorum cum medio diastoles auricularum: medium diastoles ventriculorum cum fine diastoles auricularum; tandemque finem diastoles ventriculorum eodem recidere, scilicet cum principio, ut diximus, systoles auricularum." De Motu Cordis et Aneurismatibus, Lugduni Batavorum, 1740, Prop. lix. p. 193.

* Ibid. Prop. xxv. p. 93. † Ibid. Prop. lx. p. 194.

‡ De la Structure du Cœur, &c. tom. ii. p. 33.

Whether the opinion of Lancisi be true or not, his observations confirm, in a remarkable manner, the fact, that the contraction of the auricles immediately precedes the contraction of the ventricles, and that the succession of these motions is so instantaneous that it is difficult to distinguish them from each other. This fact appears to me established by the other authorities I have adduced, which I have selected in preference to many others to the same purport; because the descriptions contained in them are well known to have been founded on, or verified by, the personal observations of their authors. I may add, that, in my own limited opportunities of examining the contraction of the heart in living animals, the phenomena appeared to me to correspond very exactly with the accounts which I have quoted. The contraction of the auricle appeared the first motion of the heart, and was followed so immediately by that of the ventricles, that I have found it very difficult, if not impossible, to distinguish any interval between them.

The accuracy of these statements, with regard to the order in which the contractions of the auricles and ventricles succeed each other, may frequently, I believe, be confirmed in another manner, by observation on the human body, while all the parts are in their natural state. It is very generally allowed, that, on the contraction of the auricles, a portion of the blood they contain is driven back into the venæ cavæ, and produces in these vessels a pulsation extending often to a considerable distance from the

heart. This is seen in experiments on the lower animals. In the human subject, this venous pulsation is frequently distinctly observable in the jugular and subclavian veins, in certain diseases of the heart or of the lungs, in which the flow of blood through these organs is impeded; but it can also be sometimes observed at the root of the neck in individuals in whom there is no reason to suspect organic diseases of these organs, particularly in thin persons, whose veins are large and lax. In such instances I have frequently examined the motions of the artery and vein very attentively, and have remarked, first the pulsation of the vein indicating the contraction of the auricle, immediately followed by the pulse in the artery indicating the contraction in the ventricle, and then an interval marking the diastole of the heart, again followed by the successive pulsations, first in the vein, and then in the artery. In one instance, in which the venous pulse was very distinct at the roots of the right jugular and subclavian veins, and in which the two consecutive succussions of the heart could be felt by the hand placed on the thorax, I repeatedly examined the succession of the phenomena, and I observed, first the vein to be dilated; then the artery immediately to beat; and then could feel the second succussion of the heart: after which there was a short interval before the vein again pulsated. Here, I conceive, was distinctly shewn, first, the contraction of the auricle marked by the pulse in the vein; secondly, that of the ventricle evinced by the beat of the artery, and

accompanied by the first succussion in the thorax; and, thirdly, and last, the second succussion in the thorax, observed immediately to follow the first, distinct from the contraction of the auricle, and separated from it by the contraction of the ventricle on the one hand, and the interval of repose of the heart on the other.

From all these considerations, I am led to conclude that the second consecutive sensation communicated to the ear or hand when applied to the thorax, is not occasioned by the contraction of the auricles. Indeed Lænnec seems to have been, in some degree, aware that his account of its relation to the other motions of the heart is not exactly reconcilable with the descriptions of the actions of this organ given by those who had examined them by inspection; for he remarks, "this repose, after the contraction of the auricles, does not appear to have been known to Haller, or, at least, it was not regarded by him as a natural state*." Lænnec conceived, indeed, that the motions of the heart could be examined more exactly by means of the stethoscope than by the opening and inspection of living animals; but he does not inform us by what process of observation or of reasoning he satisfied himself that the second of the consecutive sounds emitted during the action of the heart, is dependent on the contraction of the auricles. I suspect it must have been a somewhat hasty assumption, which was not unlikely

* De l'Auscultation Mediate, tom. ii. p. 406.

to be made. In the action of the heart, two consecutive contractions had been seen; and, on applying the hand or ear to the thorax, two consecutive succussions or sounds were observed. As one of these sounds or succussions was found to correspond with one of the contractions, that, viz. of the ventricles, the inference would immediately, and not unnaturally, suggest itself, that the second depended on the other contraction, viz., that of the auricles; an inference which I have endeavoured to prove to be erroneous.

I am disposed, therefore, to conclude, that, in applying the ear or the hand to the thorax, the contraction of the auricles of the heart either is not evident to the senses, or is perceived continuous with the contraction of the ventricles, and that the two contractions communicate only one sensation—the first of the two consecutive sounds and succussions. The latter of these suppositions seems to me the more probable, and to be supported by the length of the period which the first succussion occupies.

It remains to be determined, on what depends the second of the sounds and succussions which takes place immediately after the contraction of the ventricles. Can it be accounted for by the impulse occasioned by the falling back on the pericardium of the relaxed heart in its diastole, after it has been elevated or moved from its place in the systole? It has long been a common opinion that the heart is not inactive during its diastole, but has a power of dilating its ca-

vities. Some authors have attributed this power to a *vital* action of the muscular fibres of the heart, an hypothesis that does not appear tenable, or to be reconcilable with what is known respecting the structure of this organ, and the living properties of muscular fibre. Others have attributed it to a *mechanical* power of the heart—its elasticity,—by which the cavities of the ventricles, when contracted or compressed, have a tendency, they say, to expand themselves again in the same manner as a bag of caoutchouc or strong leather expands after having been compressed; or as an artery removed from the dead body recovers and retains it cylindrical form and cavity, after its parietes have been pressed together. On this supposition has been founded the hypothesis that the motion of the blood depends in part on the ventricles of the heart attracting this fluid by suction into their cavities, from the corresponding auricles. This hypothesis does not seem improbable; and such an action, if it really occurs, may perhaps contribute, in addition to the falling back of the heart, to produce the sensation communicated to the ear or the hand, which I am endeavouring to explain.

This explanation of the second succussion of the heart seems to me to correspond very exactly with several of the phenomena observed during it; for instance, with the apparent retrocession from the ear of the sensation it communicates, as described by Lænnec; with the motion appearing deep in the chest, and proceeding from near the base of the heart; and with the impulse felt during it when the body is laid on the

left side or on the face; and if the hypothesis of the dilatation of the heart by its elasticity, and its consequent power of suction, be true, this may be conceived to produce a sound very analogous to those to which M. Lænnec has compared that emitted by the heart,—the raising of a valve or the lapping of a dog.

In offering any conjecture with regard to the actions or motions of the heart, I am well aware of the numerous sources of fallacy to which we are exposed in attempting to judge of phenomena concealed from our view in their natural state, and in the production and modification of which a great variety of causes may concur. The very object of this essay could not fail to impress my mind with the existence of such difficulties, and to render me very diffident with regard to the value or correctness of any opinion I might form on the subject to which it relates. If the views I have taken be correct, it is obvious that an error pervades the otherwise valuable descriptions given by Lænnec of the actions and diseases of the heart; for in all of them the second sound heard in the motion of the heart is considered and denominated the contraction of the auricles. If, as I suppose, this eminent pathologist has been mistaken in this opinion, it would afford the strongest proof of the difficulty of avoiding the causes of deception, and of the impropriety, in describing the phenomena, or in judging of the nature of diseases, of proceeding on a doubtful physiological hypothesis.

Since the foregoing Essay was read to the Society, I have perused a Thesis published by Dr Barry "Sur le passage du sang à travers le Cœur," in which, among the pathological propositions deduced from the experiments and reasoning contained in it, there are the two following:—"2e, Les deux sons que le cœur présente à l'auscultation sont produits par la dilatation des ses cavités, et non par leur contraction. 3e, Le premier son, qui ne correspond pas toujours à la pulsation arterielle, est le resultat de l'éxpansion des appendices, et le second de celle des ventricules." The experiments related in this Thesis, as well as those contained in Dr Barry's previous publications, appear to me very ingenious and original; and to illustrate interesting facts respecting the state of the heart and of the blood-vessels connected with it, during the circulation, and the effects of respiration on the motion of the blood in the large venous trunks. I cannot, however, fully comprehend the author's statements and reasonings with regard to the effects produced on the motions of the heart, and on the passage of the blood through this organ by the removal of the atmospheric pressure. If I understand his meaning rightly, some of the conclusions and inferences do not appear to me to be warranted by the experiments related, or by what is known of the mechanism or functions of the organs of respiration and circulation. It is not my intention to enter into a detailed discussion of this subject;

but I may remark, that even if it were allowed that the act of inspiration may have some effect in attracting the blood to the right auricle of the heart, which is directly connected with the large veins *external* to the thorax; yet I conceive a similar effect cannot be produced on the left side of the heart, because the whole of the veins connected with the left auricle are *within* the thorax, and consequently exposed equally with the heart itself to the influence of any power which has a tendency to remove the pressure of the atmosphere from the viscera contained in that cavity; so that such a power cannot have any influence in promoting the flow of blood from the pulmonary veins into the left auricle of the heart. There are facts, also, which shew that there are other powers quite independent of the removal of the pressure of the atmosphere from the surface of the heart, either by respiration or by its own contraction, which are sufficient to produce the motion of the blood through the heart and blood-vessels. This seems to be proved by the circulation of the blood in the fœtus in utero; and by the cases in which the surface of the heart has been exposed to the atmosphere, and its action, and the circulation of the blood have continued. We have examples of this kind in infants, in which the heart has been protruded to the outside of the thorax, through an aperture in that cavity, and in cases in which the cavities of the chest and pericardium have been opened by injury or disease. It appears also to be proved by experiments on ani-

mals, in which, after the muscles of respiration have been paralysed by poisons, or the cavities of the thorax have been laid open, the action of the heart and the circulation have been continued by maintaining artificial respiration; as well as by cases of asphyxia in the human subject, in which, the motion of the heart and of the blood has been restored by the inflation of the lungs through the trachea: in these experiments and cases it is obvious that, instead of the pressure of the atmosphere being removed from the heart or lungs, an additional pressure is made on all the contents of the thorax, during its expansion. With regard to the explanation offered by Dr Barry of the sounds emitted during the action of the heart, I cannot discover that it is justified by any of the facts stated in the experiments, or by the reasoning founded on them. The cause assigned for the second of the consecutive sounds appears to me liable to the same objection that I have stated to that supposed by Lænnec; for the dilatation of the ventricles is synchronous with the contraction of the auricles; and I have endeavoured to shew that this last does not coincide with the second sound or succussion produced by the motion of the heart.

ON A

NEW METHOD OF PRESERVING

ANATOMICAL PREPARATIONS.

By JOHN DAVY, M. D., F. R. S., Physician to the Forces, Corresponding Member of the Medico-Chirurgical Society of Edinburgh.

DURING the last two years and a half, as leisure and opportunities have permitted, I have been engaged in making trial of a method, which I believe to be new, of preserving anatomical preparations, the advantages attending which have exceeded my most sanguine expectations.

Its principal advantages consist, *first*, in its great cheapness; *secondly*, in the durability of its preservative power; and, *thirdly*, in the clear and instructive manner in which it displays the minute structure of textures and compound parts.

Its great cheapness will be immediately obvious when I mention what it is, and that it is simply the sulphurous acid, which may be prepared in a manner equally economical and easy, by burning sul-

phur matches over water in any appropriate vessel *, agitating the water when the match ceases to burn, and, when the water is sufficiently impregnated with the acid gas, filtering the solution to render it clear and transparent.

Its durability I infer from circumstances which carry conviction to my mind. I have preparations by me which were made nearly three years' ago: nothing has since been done to them; no fluid has been added; no evaporation has taken place; and they are as perfect at this instant as at the moment when they were immersed in the acid, and merely confined in a bottle with a glass stopper, lubricated with a little cerate. But it is not so much from my short experience of the efficacy of the fluid, as from other considerations, that I have been induced to conclude so favourably of its preservative powers. From the experiments which I have made, the sulphurous acid appears to have nearly the same power in preventing the putrefaction of animal matter as it has of stopping the fermentation of vegetable juices. I find that serum coagulated by this acid gas, and converted into a kind of jelly, may be kept in water several weeks, exposed to the air, without undergoing any change; that the fibrine of the blood thus treated is equally exempt from change, and that the red particles of the blood, rendered by it of the colour and consistence of thick tar, exposed

* The best kind of match for this purpose is that which is used in Italy,—cotton-thread dipped in melted sulphur.

in water to the air, becomes, indeed, covered with a kind of mildew or byssus, and emits a peculiar disagreeable smell, but not a putrid smell. I mention the serum, the fibrine, and the colouring matter of the blood, because they decompose and become putrid very readily (the two latter especially) sooner than most animal substances; and, therefore, what is applicable to them is *a fortiori* to anatomical preparations *. I have made similar and direct trials of many preparations; I have exposed them to the air in this acid, and have taken them out of the acid and placed them in water exposed to the air, and the result has been satisfactory; shewing, that, after having been well acted on by the sulphurous acid, they are no longer liable to putrefaction. Some of these have undergone very little change during exposure to the air for several weeks in water; others have become soft and gelatinous, and have been partially reduced to a pulp, but without emitting any offensive odour, like that of putrid animal matter, —an odour rather like that of decaying vegetable matter affected with mildew.

How the sulphurous acid acts in preserving animal substances it is difficult to say. I am not aware

* Since the above was written, I find the remark in the text does not hold good of serum. When clear, this fluid becomes putrid slowly; a portion of serum which has been exposed to the air eleven days, at a temperature of about 60° Fahr., is now only very slightly tainted; moist fibrine, in the same circumstances, would have become offensive, and, in three or four days, a putrid sanies.

that it is yet ascertained how it preserves vegetable substances; how it prevents vinous fermentation in vegetable juices, such as are most prone to undergo it, as the juice of the grape, &c.; how it prevents light wines and vinous fluids to which atmospheric air has access, from becoming sour or converted into vinegar; or how, moreover, it stops the process of ulterior change to which unpurified vinegar, and most, if not all, of the unpurified vegetable acids are disposed, when exposed to the air. It is not owing to the mere abstraction of oxygen, for phosphorus has not the same effect permanently, nor nitrous gas. It may be conjectured, both in the instance of vegetable and animal substances, that the antiseptic power of the acid depends on its effecting some new arrangements of the particles of the proximate principles which render them exempt from the changes alluded to; or render inert the vegetable and animal leaven which, under favourable circumstances, excite these changes. The subject is one full of difficulty and mystery, and the discussion of it further would be here out of place, and foreign to the object which I have at present in view.

The last advantage which I have mentioned, the manner in which the acid displays the minute structure of textures and compound parts, is that which I shall most dwell on, as I consider it its chief recommendation to notice. It does not, like spirits of wine and a solution of alum, contract what is immersed in it; it does not, like a saturated solution of common salt, or of nitre, or of any of the salts of

chlorine which I have tried, after a little while, lose its transparency and become thick and turbid; nor does it, like a solution of corrosive sublimate, deposite on the inside of the glass and on the preparation itself, a crust which soon becomes a complete mask *. On the contrary, it expands and developes the parts, some more some less, so as to magnify them and make them more distinct, effecting in structure what the lens does in vision; and, at the same time, it remains clear, so that the lens still may be employed to heighten the effect and convey still more minute information of the object.

I beg leave to enter into some details in illustration. I shall commence with its effects on the simple textures, and from thence proceed to the more compounded. All the descriptions which I shall give will be taken from preparations which are before me, and from the human subject.

The skin immersed in the sulphurous acid swells considerably, and the cuticle is either thrown off or very easily detached. The cuticle of the sole of the foot, to mention a particular instance, is rendered almost transparent, and is but little thickened. When held between the eye and the light, its symmetrical structure is beautifully shewn, with innumerable dotted points, as it were, in the course of

* Owing to the decomposition of corrosive sublimate and the deposition of calomel, principally the effect of light.

its linear waving, which probably serve the purpose of pores *. If the cuticle, detached by means of sulphurous acid, is dried, it shews its peculiar structure still more distinctly and elegantly.

The cutis, distended by the sulphurous acid, appears as a tissue of extremely minute fibres and particles, condensed towards the outer surface, when in contact with the cuticle, and loose internally, where it gradually blends itself with the adipose texture.

Serous membranes, immersed in the acid, swell considerably, and lose very little of their transparency. The inner surface of a portion of pericardium, now before me, has an uneven surface, and exhibits when examined with a common lens, a slight appearance of pores; its section shews as if it were composed of layers, and its outer surface displays a loose intertexture of fine fibres. A portion of pleura, with the exception of the cut part, (which is very much thinner, and not visibly in layers), appears very similar, but less distinctly.

On the cellular structure, the sulphurous acid has much the same effect as on the serous;—it distends it greatly, and preserves it transparent.

On fibrous membranes the sulphurous acid has not much effect; they become swollen in it slightly, and diaphanous. The outer layer of the dura mater,

* Probably similar to the very minute cavities in the skin of the common toad, which allow light to pass through them, but not the most delicate probe, being covered with a very fine transparent membrane.

in a specimen before me, is considerably corrugated, whilst the inner has remained smooth, which, perhaps, is owing to the outer being of greater density than the inner, (as it appears to the eye to be); in consequence of which greater density, it is more expanded. The sclerotic coat of the eye is equally acted on throughout; and is not in the slightest degree wrinkled. The outer surface of the tunica albuginea testis is corrugated very slightly.

It acts more powerfully on tendons and ligaments; and on some more than on others, shewing a striking difference in this respect. The tendons of muscles in general it expands amazingly, and renders semitransparent. To take an example, —the tendo Achillis thus swollen has the appearance of an opalescent mass, divided pretty regularly into cells, the boundaries of which are white opaque lines. On the ligamentous sheath of the penis its expansive power is less forcibly exerted; the sheath is rendered nearly transparent; and its structure is beautifully shewn, as if composed of a white pulp as a ground-work, intersected and bound together by very fine opalescent fibres. On the aponeurotic sheaths of muscles, its effects are very similar. On the chordæ tendineæ of the heart its effect is inconsiderable; it expands them but little, and renders them semitransparent. On one part of the intervertebral substance it acts in the same manner as on tendon, of which part the inner portion, that nearest the cavity of the abdomen, chiefly consists, at least in the lumbar region; but, on the other

part, its action is hardly perceptible. In consequence of this difference of action of the acid on the component parts of the intervertebral substance, it is well adapted to display its peculiar compound structure. When the acid is strong, an imperfect solution of a part of the tendon or ligament takes place, which subsides in the form of a semitransparent very fine jelly.

Cartilage is not changed by the acid; neither the dense cartilages of the ribs, or the delicate ones attached to certain organs, as the tarsus, epiglottis, &c. It is equally inactive on bone. Nor does it appear to have any sensible effect either on muscular fibre, or on the substance of the brain and spinal chord, or of the nerves and gangliă. On mucous membranes its action is considerable: it does not appear to dissolve them in the slightest degree, but it distends them; renders them firm; and shews their peculiar structure in a very striking manner. As an example, I shall give a brief sketch of the primæ viæ. First, I may premise, that it displays the cuticle or epithelium, terminating abruptly in the œsophagus, just above the entrance of the latter into the stomach, and in the rectum, just within the circle of the anus, or the upper boundary of the sphincter muscle. In both, the termination is distinct, and abrupt, and unquestionable, as it appears in a preparation now before me *.

* It appears very questionable, that the stomach and intestines generally, the gall-bladder and the biliary ducts, the urinary, seminal and the air passages, possess an epithelium analogous to cuticle and a continuation of it. All these parts must necessarily have a

When the epithelium is removed, (and it is most easily, either by placing it under a stream of water, or by the friction of the fingers), and the mucous coat is brought distinctly into view, in the upper part of the œsophagus it appears very thin, provided with many and pretty large mucous follicles on each side, and several minute branches of nerves. With a magnifying glass of ordinary power, it seems to contain a most delicate tissue of white lines, running chiefly longitudinally, branching off slightly and anastomosing. The same appearance presents itself in the middle and lower part of the œsophagus, and more distinctly. But it is only in the upper part that any nerves can be seen distinctly ramifying in the semitransparent mucous tissue. In the middle no follicles are visible, and only a few near its termination. Where it terminates, there is, in one preparation before me, quite a zone of what appears to be minute follicles: But this does not shew itself in another preparation.

At the cardiac orifice of the stomach many minute follicles present themselves. Where the gullet ends, and the stomach commences, there is a sudden change of the appearance of the mucous texture; the linear pencilling, (if I may be allowed the expression), suddenly ends; and, as it were, a dotted one commences, and with some variations,

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lining membrane, which seems to be their mucous coat, in each part somewhat different. It has been supposed that the mucus secreted by the membrane serves in lieu of cuticle, and it seems to be a probable conjecture.

extends throughout this organ. When magnified, it has the appearance of a very delicate lacework, formed in the upper part, by the close juxta-position of circular lines; and, in the lower, by lines in the form nearly of the figure of 8; and, in the great arch of the stomach, by lines irregularly tortuous. But this, it must be confessed, is not to be seen in every preparation that I have examined; and, therefore, I would rather limit myself by saying, that, in the stomach, the mucous texture has the appearance of a very delicate lacework of lines or vessels.

At the commencement of the duodenum, the appearance of the texture again distinctly changes. Here it appears as if covered with tortuous threads or vessels twice or thrice the size of those of the mucous coat of the stomach; and, as the duodenum descends, the appearance strengthens. In some preparations there is an appearance of follicles, and of circular depressions, but not in all I have examined; and, when seen, they are most distinctly seen with the naked eye. A longitudinal section, including the pylorus, strikingly and invariably shews a layer of a minute glandular structure, embracing and belonging to the mucous coat of the duodenum, which terminates abruptly at the pylorus, but gradually in the contrary direction, and disappearing, or nearly so, about an inch and a-half from the pylorus. The same section, too, shews how very thick the muscular and cellular coats of the stomach are, in comparison with those of the duodenum.

The inner coat of the jejunum, viewed with the naked eye, in sulphurous acid, appears to be distinctly villous, or as if studded with innumerable projecting capillary points; but this appearance vanishes when it is examined with a common lens; then, in some lights, it appears to be covered with convoluted threads, having a kind of centre, round which they are described, which, to the unaided eye, seems a minute mucous gland; and, in other lights, as minute projecting laminæ variously bent.

As the jejunum passes into the ilium, and as the ilium descends, another change takes place, and it is very strongly marked close to the termination of the latter intestine, where the mucous coat is truly villous;—so it appears to the naked eye in sulphurous acid; and, when examined in a favourable light with a lens, the villi exhibit the appearance of tubular projections rounded at the ends; and some of them have a form approaching to the conical, rather than the cylindrical. The sulphurous acid makes the glandular structure of the lower part of the ileum very distinct to the naked eye.

This villous structure terminates suddenly at the valve of the colon (where the valve begins), and a new kind of structure succeeds it in the valve, and proceeds, with very little variation, of the same kind throughout the large intestines, even to their termination, not excepting the appendicula vermiformis. It resembles honeycomb in its appearance, more than any thing else to which I can compare it; but it is so very minute and delicate in every

part of the large intestines, that it cannot be well distinguished, excepting with the aid of a magnifying glass. The glands, on the contrary, of the large intestines, appear very distinct in the sulphurous acid; and their orifices are easily seen.

Before I quit this subject, I wish to make a few remarks on the ductus communis choledocus, and the pancreatic duct. The structure of these parts, as well as of the mucous coat of the gall-bladder, is beautifully shewn by immersing them in the sulphurous acid. In this acid, the kind of valvular apparatus with which the common gall-duct and the pancreatic duct are provided towards their orifice, consisting of lancet-like projections, of the mucous membrane hanging downwards, may be demonstrated most easily and satisfactorily; and I have before me several preparations of these parts, in which they are clearly exhibited, in the manner in which they have been represented in a drawing attached to a paper, which, some months ago, I sent to the Royal Society, descriptive of their peculiarities.

These observations on the alimentary canal have occupied so much space that I must avoid, at present, making any remarks on the other mucous membranes examined by means of the sulphurous acid. I may briefly mention, that this acid shews them equally well as the primæ viæ, and enables me equally well to notice how they differ from each other. I shall now proceed to the more complicated parts.

By rendering the fibrous neurilema, and the connecting cellular tissue, semitransparent, and by expanding these textures, the sulphurous acid has a remarkable effect in displaying the nerves, with the exception of the ganglionic. It shews, almost without dissection, and still better when aided by dissection, which it facilitates, the parts of each fasciculus of nerves and their junctions; and, if the nerve be cut, the proportion of the medullary matter which it contains, which becomes projecting, squeezed out, owing to the pressure just alluded to. It shews very distinctly the fibrous nature of the optic nerves beyond their junction; but, at their junction, and towards their thalami, their substance appears to be exactly similar to the common medullary substance of the cerebrum. It shews the papillæ of the tongue to be each the termination of a minute nerve, and this without the aid of a magnifying glass. It demonstrates how, as the nerves proceed from their source, the proportion of medullary matter diminishes, and the thickness of their sheath increases; and this very remarkably in the nerves of the fingers. On the ganglionic nerves, judging from the very few trials which I have yet made, it appears to have but little effect, as if their composition were different from that of the other nerves, as has been lately maintained.

It displays, too, almost without dissection, the composition of the vessels, and, I may add, of the passages and canals of the body generally; owing to its expanding, in different degrees, the several coats

of which they consist. I have little doubt, from the trials I have made, that were the arterial and venous coats examined minutely throughout these two systems of vessels, a variety of texture would be discovered in each, in their different parts, not less great and striking than in the different parts of the alimentary canal.

The manner in which it exhibits the muscles is most distinct in all the details of their anatomical structure. A transverse section of a long muscle, well steeped in strong sulphurous acid, is an interesting anatomical object. With the naked eye its constituent parts may be clearly seen, the bloodvessels and nervous filaments, the muscular fibres collected in bundles of different sizes, and connected by cellular tissues and ligamentous threads.

The effect of the acid on other compound parts is not less instructive. Were I to describe the appearance which the more important only exhibit in this fluid, I should greatly exceed the limits of a dissertation, and trespass too much on the time of the Society. In this part of my subject I must confine myself to one example, which I select, as being well adapted to illustrate the effects of the acid on an organ variously compounded. This example is the penis: immersed in the acid, it swells like a sponge when put into water, and very soon becomes completely distended; then, when the cutis has been dissected off, its ligamentous sheath is brought beautifully into view, with the nerves and vessels on the dorsum penis running superficially through this

sheath, now rendered transparent; and sections, in different directions of the organ, display equally clearly its internal structure, which, to the eye, either naked or assisted by glasses of different powers, appears to be distinctly cellular, analogous to the substance of the lungs; or, perhaps, still more analogous in appearance to the structure of the common sponge, especially the anterior part of the corpora cavernosa, where the cells irregularly formed are largest, and where, as in a cut piece of common sponge, there are large circular orifices, which seem to belong to canals formed of ligamentous substance, which penetrate a certain way, and terminate abruptly with closed extremities*.

For the purposes of pathological anatomy, I believe the sulphurous acid will prove equally if not more useful, than for those already alluded to. I rest this opinion partly on the trials which I have made, and partly on the consideration, that, whilst its expansive power is so great on most tissues, its solvent power is very inconsiderable, and on coagulable lymph appears to be null, (an ingredient of the

* The appearance of the corpora cavernosa, distended with sulphurous acid, is not favourable to the notion, at present advocated by physiologists of great authority, viz. that it is a plexus of blood-vessels, in common with all the erectile tissues. The irregularity of form of the cells, their free communication in every direction, and other circumstances, which might be mentioned, are highly favourable to the old idea, that they consist of a distinct cellular structure. Suppose that the sinuses of the dura mater were as minute as the cells of the corpus cavernosum, would they not be considered as veins in structure as well as in function?

blood, which, in most morbid changes, acts so important a part); and it appears to be null on mucous membranes, the seat of so many diseases The specimens which I have by me, of diseased parts preserved in this acid, are satisfactory beyond my expectation; not so much as shewing the exact diseased appearance, such as it presented itself on dissection, as in giving a correct notion of the nature of the lesion, by magnifying and rendering more distinct the effects of the disease, contrary to what happens when the morbid parts are immersed in spirits of wine*.

The sulphurous acid enables one to detect the slightest relaxation of mucous membranes, existing even in so slight a degree, that, without this aid, it might escape detection. It enables one, too, to detect the cicatrices of old ulcers†; to detect coagulable lymph poured out and adhering to their surface, even in the intestines, constituting a false mem-

* For the purpose of pathological research, the part to be examined may, with advantage, be immersed for a few hours in sulphurous acid, and then transferred to a cylindrical bottle, of thin and very clear glass, full of water, perfectly clear; very slight changes in the delicate structure of the part, before obscure, or not to be distinguished, will become apparent and distinct; and more particularly, very slight lesions and changes, whether recent or old, of the mucous membranes.

† These cicatrices, from the observations which I have made, seem to differ chiefly from sound mucous membrane, in containing no follicles, when the previous ulceration has been deep; and, when only superficial, in exhibiting a structure more or less different from that of the part in health.

brane; and to notice many other changes in relation to the different coats, vessels, &c. which it would be tedious to enumerate.

It shews equally well the effects of disease on serous membrane, on the bloodvessels, and on the viscera, especially the lungs. I have, in my possession, preserved in this acid a very delicate specimen of tubercles on a portion of pleura costalis, covered with a very fine net-work of coagulable lymph, and, after several months, it is as distinct as when first immersed, and more distinct than before it was introduced into the acid. A portion of hepatised lung, thus preserved, shews the air-cells filled with an albuminous deposition, and the bloodvessels closed with the same, and the minute branches of the bronchia. And a vomica, which has been kept in this acid, displays not only the ordinary phenomena of a tubercular excavation, but, which is considered a very rare occurrence, bloodvessels (veins) terminating in the cavity with open mouths*.

The morbid changes of the arteries are very easily examined and exposed by immersion in this acid, and chiefly in consequence of its rendering the dif-

* This occurrence, I believe, is much less rare than is commonly supposed. It may frequently be detected in tubercular excavations, by passing fine probes into the vessels which terminate in the cavity abruptly, marked by a short projecting portion, this course having been interrupted by the ulcerative process which formed the vomica. I have often found the canal of the vessel unclosed, its aperture, in a manner, hid by the projecting portion, which, in some instances, has been so situated as to act the part of a valve.

ferent coats so very distinct and distinguishable. In all the specimens of aneurism which I have examined, and in every instance of tendency to it, I have found the inner and middle coat of the vessel diseased; the latter generally diminished in thickness, and rendered brittle, and sometimes entirely absorbed in the dilated part of a true aneurism, or in the part contiguous to the orifice communicating with the sac of the false; and the inner coat corresponding generally thickened, and corrugated, and easily broken. In many instances, since I have used the sulphurous acid, I have noticed a very strong tendency in the arteries to aneurism, with only incipient dilatation, in which the middle coat of the vessel has been reduced in parts to the thinness of the finest paper, and its colour changed yellow; and the inner membrane admitting of being easily detached from this, has been thickened to thrice or more its thickness in its sound state. I mention these particular instances, rather to draw the attention of the pathological anatomist to the method which I am describing, than with a view of maintaining indirectly any particular views of pathological structure, or of imparting any new facts. I am often treading, I am aware, on disputable ground, and walking apparently boldly when the greatest caution is requisite. My apology for so doing is, that I have endeavoured to confine myself to the path of observation, and have avoided as much as possible, and I trust entirely, all wanderings with fancy or speculation for a conductor.

Lastly, in relation to the use of sulphurous acid for anatomical purposes, I must not conclude without offering some precautions taught by experience, the neglect of which may occasion want of success.

1*st*, It is of consequence that the part to be preserved is immersed in the acid, as soon as possible; for if in the slightest degree putrid, it will not be well preserved, the fluid will become turbid, though frequently changed, and the preparation will not keep.

2*dly*, If the part is putrid, as is often the case, when taken from the body, though the *post-mortem* examination is made a few hours after death, it should be immersed in a solution of chlorine in salt and water, till it is deprived of its putrid smell and tendency; then it may be washed clean, and put into the acid solution, without danger of its spoiling.

3*dly*, Attention should be paid to the strength of the sulphurous solution, to proportion it to the nature of the part to be preserved, and the object in view in employing it. If the intention is to expand and develope the structure of the parts, for the purpose of demonstration, a strong solution answers best; if merely to preserve a part as little changed as possible, a weak solution is most successful, especially if cuticle, the visible epithelium or tendinous parts, are concerned, as a strong acid separates the former, and partially dissolves the latter.

I have said, and beg leave to repeat, that all my remarks are directed to the preserving of prepara-

tions taken from the human subject. I do not know how far they are applicable to use in comparative anatomy. This, indeed, I have ascertained, that the acid displays clearly and powerfully the delicate parts of the smaller animals, for which purpose I believe it may be usefully employed; but I have not yet ascertained its fitness for preserving the same. In some experiments which I have made, the delicate respiratory and alimentary passages and canals of birds were, after some months' immersion in the acid, reduced to the state nearly of a pulp. The trials which I have made with a solution of alum, slightly impregnated with sulphurous acid gas, were far more successful; and I would recommend a mixture of the two to the comparative anatomist, for the purpose merely of preserving very delicate structures. The alum gives firmness, and, if I may use the expression without entering into explanation, durability; and the sulphurous acid gas prevents the formation of mildew, most effectually checks putrefaction, and tends to keep the solution clear.

I believe, too, that this acid is not inapplicable to the service of the botanist, for preserving entire plants and their parts, especially the smaller and more delicate. I have a bottle now before me in which many kinds of vegetables are immersed, and have been kept several months, and their forms are as distinct as ever, and in excellent preservation; and amongst them I see the flower of the

olive and the orange trees, and many more equally delicate *.

On the economical uses, and they are many, of this acid, as in relation to its power of preventing the fermentation to which all the saccharine preparations of the kitchen are so subject,—of preventing the changing of wines into vinegar, to which all the

* The effect of the sulphurous acid on the colour of vegetables, and I may add of animal substances, is much less than might be expected. Some vegetable colours it does not change, others but slightly, and very few entirely; and even the last mentioned return, though not with their original intensity, when the sulphurous acid is converted by the absorption of any gas into the sulphuric. The red rose, bleached white by the fumes of burning sulphur, on exposure to the air, again becomes red. Of animal textures, those which are white, it renders delicately so; those which are yellow, as the gall bladder, and common gall-duct stained by bile, the liver of this colour owing to disease, and parts of the supra-renal gland, it does not alter. It has very little effect in altering the healthy colour of the lungs or liver; but, where there is blood either effused in the parts, or contained in its vessels, the acid changes its colour to dark-brown, and, by coagulating it, fixes it for a time; and thus it is well adapted to detect the effusion of this fluid, in parts where it is apt to escape observation, as in the substance of the spleen, liver, &c. It is often difficult to distinguish between the redness produced by inflammation, and that which is occasioned after death by the staining power of the blood. I believe (and not hypothetically) that the sulphurous acid affords a means of distinction. If the change has taken place after death, the part stained will be rendered brown by the acid, and in other respects appear sound; but if, during life, owing to inflammation, by immersion in the acid, either coagulable lymph will be detected effused on the surface, or under it, or serum in the adjoining cellular tissue, or some slight ulceration of the part affected.

lighter and more delicate ones are liable,—and, further, of preventing the common vegetable acids, as vinegar and lime-juice, &c., and vegetable preparations in general, from spoiling, it would be unsuitable in this place to dwell. I shall merely remark, that the efficacy of the acid in all these respects is great and extraordinary, as must be known in part to many, and which may be learned by the easiest trials. This subject, the economical uses of the sulphurous acid, is an important one to society, and would well reward the labours of the inquirer who would undertake the minute investigation of it.

Corfu,
Dec. 5. 1827.

NOTICE

OF SOME

REMARKABLE MORBID APPEARANCES IN A SKULL,

EXHIBITED TO THE MEDICO-CHIRURGICAL SOCIETY OF EDINBURGH.

By George Ballingall, M. D., Regius Professor of Military Surgery, &c. &c.

The skull which I have now the pleasure of exhibiting was brought from the coast of Africa by Dr A. Stewart, Surgeon to the Forces, a Corresponding Member of this Society; and to him the Society is wholly indebted for the following particulars regarding it.

"*Edinburgh*, 18*th February* 1828.

"John Baker, an out-pensioner of the 2d West India Regiment, a spare slender made man, forty years of age, a native of the Akoo country, Western Africa. In the month of September 1826, he applied at the hospital at Sierra Leone for advice respecting the growth of tumours on his head, accom-

panied with headachs and loss of vision. His statement of his case was: 'That his health had been particularly good till 1824; a great part of that year he had been actively employed against the Ashantees, on the Gold Coast, where he was exposed to much fatigue, cold, and wet, and to those privations the usual attendants of war. This gave rise to several attacks of fever and bowel complaints; his general health began to decline; and towards the end of the year he first noticed the formation of the tumours on the head. For some time they gave no uneasiness, but as they increased in size and numbers, the headachs commenced with a gradually impaired state of vision.' On examination, there was amaurosis of both eyes; he said 'he felt as if the skin of his head was tied down to his brain.' The head exhibited a bumpy appearance from the tumours, the largest of which was situated over the sagittal suture, and of the size of a large hen's egg; there was also one on each side of the lower jaw. They had a steatomatous feel, and appeared adherent to the bones beneath. Handling excited little or no pain, and the covering integuments had the natural colour. He was somewhat emaciated, appetite good, and the general functions of the system seemed to go on regularly. He had no appearance of scrofula, never had the venereal disease, nor used mercury.

"The largest tumour was punctured with a lancet, a little venous blood only followed, and the wound healed kindly.

"The disease being considered incurable, no treatment was recommended beyond contributing to general health—he continued to be seen from time to time, but no material alteration had taken place either in the growth of the tumours or aggravation of the headache.

"February 1827, he was seized with a severe attack of diarrhœa, and carried off after a short illness: and putrefaction having commenced before the body could be examined, no post-mortem examination took place.

"An incision was made into the largest tumour, which appeared to consist of a reddish mass like fat.

"Every bone of the head and face is more or less engaged in disease, with the exception of the malar and superior maxillary bones. In some bones the disease appears as if it commenced in the diploe; the frontal and parietal bones have suffered the greatest destruction. In some parts there is a faint attempt at the generation of new bone.

"ALEX. STEWART."

Plate IV, illustrative of this paper, is engraved from a full sized drawing in my possession, and exhibits a view of the right side of the cranium, upon which the perforations are most numerous. They are, generally speaking, of a circular form, and their edges shelving from without inwards, the absorption of bone being greater in the external than in the internal or vitreous table of the skull.

A view of the left side of the lower jaw is also given in the plate, shewing an extensive absorption of the alveolar processes on that side, and of the substance of the jaw itself. This point was the seat of a tumour similar to those on the surface of the cranium, and I learn upon particular inquiry from Dr Stewart, that the whole of those tumours, so far as examined, were of a steatomatous, or, perhaps more strictly speaking, of a sarcomatous structure, without any traces of suppuration,—a circumstance which I am induced to notice from having, in one instance, observed a circular aperture in the sternum, precisely like one of the perforations here represented, in a patient who had been affected with numerous circumscribed chronic, or, as they are termed by some of the French writers, cold abscesses.

OBSERVATIONS

ON THE

EFFECTS OF THE SUN'S RAYS

ON THE HUMAN BODY.

By John Davy, M. D., F. R. S., Physician to the Forces, Corresponding Member of the Medico-Chirurgical Society of Edinburgh.

It is known to every one, that exposure to the sun's rays renders the skin brown; but I am not aware that this well known effect has hitherto been investigated with any minuteness, if at all, either in relation to the manner in which it is produced, or the parts of the skin in which it takes place, or its exact cause, or its consequences.

In this communication I shall have the honour of submitting to the Medico-Chirurgical Society of Edinburgh, the observations which I have made, with the desire of elucidating these points.

1. *Of the changes connected with the discoloring effect of the Sun's rays.*

For the purpose of ascertaining these changes, a portion of the back of the fore-arm, which had never before felt the sun's action, was exposed to bright sunshine, in Corfu, during an hour and a-half, on the 29th July 1826, in the middle of the day, when the thermometer was at 78° in the shade. At the end of that time the skin was slightly painful, red, and hot. On the 1st August, the erythema was nearly in the same state; during the night the redness of the skin had been brightened, and the sensation of pain increased. On the 2d, there was very little alteration; a thermometer applied to the inflamed part rose to 96°, or 1° higher than when applied to the adjoining skin. On the 3d, desquamation had commenced at the circumference; hence, where the cuticle had separated, the part was brownish-red, and not painful. In the middle, where the cuticle firmly adhered, the colour continued to be rose-red, and the pain continued, though in a less degree. This middle part, it may be remarked, in which the erythema was most durable, was most inflamed, the sun's rays having struck on it perpendicularly; whilst, on the circumference, from the rotundity of the arm, they impinged on it obliquely. On the 5th, desquamation was making progress; pain had ceased; the part was reddish-

brown at the edges, but still red at the centre; the temperature of the part was not above that of the adjoining skin. On the 8th, the part was uniformly of a reddish-brown; desquamation was still taking place, the new cuticle separating almost as fast as it formed, not in continuous pieces, as in the first instance, where the old was detached, but in small scales. On the 18th, the part was of a light-brown, with a very slight admixture of red, and its tendency to desquamation was very little greater than natural; in brief, it was in that state in which the skin is commonly said to be when tanned by the sun.

2. *Of the part of the Skin in which the discoloration takes place.*

Dr Bostock, in his learned and useful "Elements of Physiology," remarks, "It has not been ascertained upon which part of the integuments the sun acts, whether upon the epidermis, the corpus mucosum, or the cutis;" and he immediately adds, but it is probably upon the epidermis, because we are informed that the tan of the skin is removed by blisters."

Were it a fact that the skin is rendered fair by blisters, the argument would be plausible,—I had almost said conclusive; but, as it is well known that blisters themselves render the skin brown, this argument can hardly be received.

From the observations which I have made, and from analogical reasoning, I am disposed to believe

that the discoloration takes place beneath the cuticle, and that the seat of it principally is the surface of the cutis.

1*st*, As the sun's rays bleach hair, and as there is a considerable analogy between the hair and the epidermis, its effect on the latter, it might be expected, would be similar*.

2*dly*, I have carefully examined the cuticle detached in consequence of inflammation from insolation, and I have not found it tanned in the slightest degree.

3*dly*, Are not the phenomena described in the preceding section, relative to the immediate effects and consequences of exposure to the sun's rays, almost sufficient to convince one that the cutis is the true seat of the discoloration? Were the epidermis the seat of it, it ought to be immediately discoloured by the sun's rays, which it is not; and when the epidermis separates, the skin should be fair; but the reverse of this is the case,—not till it separates does the skin lose its bright rose-red hue; and not till after several successive desquamations is the tan of the skin well impressed and established, and many months elapse before it disappears †.

* Vide some remarks on this subject, contained in a paper on the Specific Gravity of different parts of the Human Body, which I have submitted to this Society. (This paper will appear in the latter half of this volume.)

† The discoloration produced in August, by exposure of the skin for an hour and a half, now, at the expiration of seventeen months, is just visible. I may add, that I have found it to continue much longer on a part always covered, as the arm, than on the back of the hand, which has been covered only in the open air.

4thly, I have examined, with some attention, the cuticle of the Negro, of people of colour, and of Europeans who have become dark-brown from exposure to the sun's rays within the tropics. In each instance, when detached, it has appeared much less coloured than the skin; and, when minutely inspected, it has been found to owe its colour to colouring matter attached to it, detached from the cutis.

Lastly, I have preferred assigning the surface of the cutis as the seat of the discoloration (supposing it to be proved that the cuticle is not), rather than the rete mucosum or corpus mucosum of authors, as the very existence of such a texture is problematical. From the experiments which I have made on moles, and the coloured areola of the mamilla of fair persons, and on the skin of the Negro, I am disposed to believe that the colour, in all these instances, is owing to a colouring matter deposited in minute particles or filaments, on the surface of the cutis, as a secretion analogous, in its chemical properties, to the pigmentum nigrum of the eye *. In the skin

* I find that the colouring matter of the skin of the Negro, and the pigmentum nigrum of the eye, are acted on very similarly by the three mineral acids, and a solution of potash, when heated, and by the sulphurous acid. By the former, both are dissolved; by the sulphurous acid, they are rendered of a light brown colour. They are not dissolved by these acids, or by the alkali, when cold; nor is their colour changed by a solution of chlorine in water,—contrary to what is commonly asserted of the colouring matter of the skin of the Negro. Both bear a high degree of temperature, apparently without change, viz. that nearly of a dull red heat.

of the white, even in the parts discoloured, as the foresaid areola, I have not been able to discover any traces of a corpus mucosum, when the cuticle has been separated by means of immersion in the sulphurous acid. I have found the brown colouring matter, as I have already noticed, impregnating the surface of the cutis, and to be separated with difficulty by scraping it. In the case of the Negro, the colouring matter is deposited more thickly, and more in the form of a membrane; yet I have not been able to detach it as a membrane, and only in very minute portions, and that by scraping, when the cuticle has been raised and separated with as little inflammation as possible. The evidence in favour of the existence of a corpus mucosum, obtained either by maceration of the integuments, or by the application of blisters, appears to be very doubtful. By the first process, a gelatinous or mucus-like surface may be formed; by the second, a false membrane may be produced by the effusion of coagulable lymph, exactly resembling a corpus mucosum. I do not make these remarks hypothetically, but from experience,—from observing the effects of blisters on parts of the skin in which there have been moles; on the areola of the mamilla; and on the skin of the Negro. In all these examples, the effects generally are very similar. If the blister is mild, the cuticle is simply raised; in the instance of the Negro, with a very little colouring matter adhering to it. When severe and long continued, not only is

the cuticle raised by serum effused, but also by coagulable lymph, to which is attached colouring matter, and which may easily be mistaken for a coloured rete mucosum, and which is easily separated as a continuous membrane. When severe inflammation and suppuration is excited, the colouring matter either comes away spontaneously, or is most easily detached *. It appears to be most firmly connected with the cutis in the instance of moles, next in that of the brown areola of the nipple, and least in that of the black skin of the Negro. The part, in healing, when covered with the first formed cuticle, is red; it soon becomes brownish, but a considerable time elapses before it acquires its former intensity of colour. In the instance of the Negro, in which I have watched its progress, the secretion of colouring matter began at the edges, and spread towards the centre; and then, after a few days, spots of black appeared in the middle, which enlarged till the whole area was coloured. When a part not discoloured is blistered, in healing, it passes from red to brown; and it is often a long time before the part regains its healthy hue; generally, I believe, the fairer the skin, the less it is made brown by a blister, and the sooner it recovers its original whiteness; and I believe the hotter the climate and season, so much the slower it regains it.

* Thus it may be obtained in large pieces, very much resembling a membrane; but the connecting medium, I suspect, is coagulable lymph.

3.—*Of the Cause of the Change of Colour, and of the manner in which it operates.*

My experiments relative to the cause of the change of colour produced in the skin by the sun's rays, are not so satisfactory as I could wish. They tend, however, rather to prove that the effect is produced solely by the undecompounded rays. I have exposed, for more than two hours, and that repeatedly, the delicate skin of the under part of the fore-arm to the solar spectrum; and I have concentrated the differently coloured rays of the spectrum, by means of a lens on the skin, but without occasioning either erythema or discoloration.

Relative to the manner in which the effect is produced, is it immediate and direct; or mediate and indirect? In other words, is it the simple effect of the sun's rays impinging on the skin; or the effect of the inflammation which they occasion; or do the sun's rays act both ways?

That they act powerfully indirectly in producing discoloration, by exciting inflammation, the facts already mentioned, are, it appears to me, sufficient to prove. Indeed, whatever cause excites inflammation or irritation of the skin, seems to have an analogous effect, and to discolour it. Erysipelas, erythema, most of the exanthemata, burns, ulcers, excoriations, all occasion this effect (and, I believe,

cold even is not an exception *), in different degrees, and very much in proportion to the intensity of the preceding inflammation, but whether exactly in that ratio it is difficult to determine. And we witness something of the same kind in mucous membranes. At least, I have observed that the cicatrices of old ulcers of the intestines are always discoloured, and either grey, blue, or almost black, apparently according to the degree of severity of the local disease which they followed.

I have just said it is difficult to determine if the effect of discoloration be exactly proportioned to the inflammatory effect. There are circumstances in favour of its not being so. The erythema produced by strong acetic acid, and the vesication occasioned by the leaf of the common walnut tree, are followed by discoloration unusually dark and durable. Nor are there facts wanting which indicate that the change of colour may take place without inflammation, and go on increasing in intensity gradually, from continued exposure to the sun, or even too bright light, without inflammation having been once produced. I remember an instance demonstrative of this, in the person of an excellent and most amiable young officer (now no more), a

* Is not the dark colour of the inhabitants of the Arctic regions as much owing to the inflammatory or irritating effect of the extreme cold of winter, as to the scorching influence of the continued sunshine of summer?

case of tubercular phthisis, complicated with other organic disease, who, in hope of deriving benefit from sailing, and sea air, was taken from his room, where he had been confined many months, and conveyed on board ship, where he was placed under a convenient covering constructed on deck, sheltered always from the direct rays of the sun, but exposed to the bright light of the summer sky of the Mediterranean. In a short time, thus situated, he lost the palid hue of the sick chamber, and became almost as deeply tanned as a native of southern Europe; and I was particular in ascertaining that the change had not been preceded by the slightest erythema, or any sensible desquamation. I may mention, in confirmation, the result of exposing, a second time, to the sun's rays the part tanned, as in the experiment first related.

On the 18th August, the part first acted on was exposed for two hours, between 10 and 12 o'clock, when the sky was unclouded, and the temperature, in the shade, about 80°. Immediately after this exposure, the tanned part was browner than before, and the adjoining white part, now exposed for the first time, was slightly red. On the 19th, the tanned part was distinctly browner and redder, a very little warmer than natural, and very slightly tender. The adjoining part was florid red, slightly painful, and hot. On the 23d, the tanned part was merely brown, a shade darker than before, while the adjoining part was undergoing desquamation, and beginning to lose its vivid inflammatory hue. And, far-

ther, in confirmation, I may relate, that I have been at some pains to learn from natives of these islands, especially of the lower classes, who are very much in the open air, what effect they have experienced from the sun's action. The result of my inquiry is, that very few of them have ever experienced the blistering or scorching effect of the sun; and when they have experienced it, it has commonly been on a part of the body not accustomed to be exposed to light; and on some occasion of unusual exposure, as that of bathing in the open sea. From all which, may it not be inferred, that the sun acts both indirectly, by the medium of inflammation, in changing the colour of the skin, and directly, without the intervention of inflammation, in producing the same effect, or in heightening it when produced?

Lastly,—Of the consequences of the Discoloration of the Skin.

Sir Everard Home has published an interesting paper in the Philosophical Transactions for 1821, in which he proves, that, when the skin is painted black, it is defended from the scorching effect of the sun's rays; and from whence he infers, that the dark rete mucosum of the Negro possesses the same protecting power.

I may remark, that I have made experiments similar to those of Sir Everard Home, and have modified them, and all of them with the same results. I may mention, that all the opaque colours which I

have applied to the skin, whether red, orange, blue, or green, have afforded protection from the scorching influence of the sun's rays, equal to that afforded by black; and, I may notice cursorily, that the habit which the ancient Britons indulged in, of painting their bodies, may thus be referred to a purpose of utility, independent of show and ornament, —the paint with which they bedaubed themselves answering in part, in place of clothing.

But though I have confirmed the experimental results of Sir Everard Home, it appeared to me, when reflecting on the subject, that his inference was not so well established as at first view might be conceived. It is founded on analogy, and that analogy not perfect; as there is this difference between the skin of a white person painted, and of a negro with a black skin; that, in the one instance, the black surface is laid on the semitransparent cuticle, whilst, in the other, it is situated under the cuticle, and on the surface of the cutis. In the one instance, the extinguishing medium is external to the insensible covering of the body; in the other, it is in contact with the sensitive surface, and may be considered as a part of it. Circumstances, too, relative to the very great penetrating power of the sun's rays, have had rather a similar tendency to augment my doubts of the strict accuracy of this analytical conclusion. As the facts which I now allude to, appear to me to be new and curious, I shall mention some of them. When the sun's rays are concentrated by a lens, they penetrate, I find, through

bone, as a portion of the cranium *; through nine folds of black crape; and, what is most extraordinary, through rolled platinum. It was easy to ascertain their penetrating through the former substances, by a luminous point appearing on a surface beneath; but through the opaque platinum no light passed, yet the rays of heat passed, which was best indicated by the sensation produced, when the metal was placed on the sensitive skin, the only part of which affected was that corresponding to the focus of the lens, the metal itself not becoming sensibly warmer. Taking, then, into consideration the difference between the painted cuticle and the dark "rete mucosum," and this very remarkable penetrating power of the sun's rays, it appeared to me that more direct experiments than those of Sir Everard Home were requisite, to ascertain, beyond all doubt, if the function of the colouring matter of the skin of the Negro is really such as it has been inferred to be. With a view to this, I have subjected the skin of the negro to the direct rays of the sun, and I have made a similar trial on a mole on a fair skin. After two hours exposure to the sun, its rays moderately concentrated by a lens, (for the experiment was made in winter when the temperature was between 50° and 60°) the part acted on, in which a dark brown mole was situated,

* This circumstance may help to explain the effect of the sun on the brain, in producing that malady commonly called *coup de soleil.*

became slightly red; the following day it was red, and just perceptibly painful; and about the fourth or fifth day, desquamation of the part commenced. The desquamation took place over the mole as well as the adjoining fair part, and the mole was evidently rendered of a darker colour. On the 27th December, when the sky was clear, and Fahrenheit's thermometer in the shade at 56°, a similar experiment was made on the fore-arm of a Negro, and continued the same time. The skin acted on was a little hotter than the rest, just perceptibly darker, and it felt, he said, slightly sore. On the following day, the part appeared to be very little darker, and he said that it was slightly painful and swollen, but this last mentioned effect was not perceptible to my eye. On the 31st December, the pain had ceased; there was not the slightest appearance of desquamation, and it was only just perceptibly darker than the adjoining skin.

From these results, I am disposed to infer, that the colouring matter of the skin of the Negro affords some protection from the scorching effects of the sun's rays, but not complete protection, and that were his skin as much disposed to inflame from the action of the sun's rays as the skin of the fairest European, this colouring matter would not prevent occasional vesication. Some of the facts already mentioned tend to support this opinion, especially the circumstance that exemption from the scorching effect of the sun is not confined to the African Negro, but is enjoyed equally by all the various

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races of men,—the inhabitants of hot climates, who are much in the open air, and exposed to bright light rays, whether the colour be almost black, like that of the lower classes of Singalese, or of a dull straw colour, like that of the Bosjesman of Southern Africa, or of a ruddy brown, as in the instance of the Albanian shepherd of the mountains of Greece.

Nature, then, I may remark, is very provident, adapting the skin, impressed by the sun's rays, to bear them afterwards without inconvenience, or at least without painful suffering, the impression having apparently a protecting effect from farther annoyance, like the first attack of many of the infectious enanthemata; but with this difference, that the susceptibility to a renewal of the action is not long suspended, unless the cause is in constant activity. How long it is suspended it is difficult to determine: it is suspended in different degrees, probably in persons of different complexions and temperaments, least in the fair, more in the brown European races, and most of all in the deeply coloured Asiatic and African tribes. Besides the foregoing, there are other means which nature employs to counteract the influence of the sun's rays on the human body, and to keep down animal heat within the bounds of health, in situations where otherwise it would be most apt to be in excess, and mount to a feverish height. These means seem to be of two kinds, one external, the other internal. Sweat constitutes one of the first; it not only cools

the surface by evaporation, but by dispersing the sun's rays, it prevents their scorching effect, which is easily shewn, by comparing the effect of the sun's rays, concentrated by a lens on a dry and a wet skin. The internal means are not very obvious; but that they do exist, and often act beneficially, I have no doubt. Within the tropics, when on a journey, I have tried the temperature of my palenkeen bearers, just before setting out, when they were agreeably cool; and I have tried it again after three or four hours' exertion exposed to the sun, at a temperature between 80° and 90°; and I have found their temperature rather diminished than increased, as indicated by a thermometer, the bulb of which was placed under the tongue, or in the axilla.* Whatever occasioned this reduction, or keeping down of animal heat, this I allude to as the internal means of counteracting external heat. However it is explained (and it would not be difficult to offer a plausible explanation of it), the fact seems to be curious; and if it is as new to others as it was novel to me, when I first made the observation, I need offer no

* Observations which I made many years ago within the tropics, with some care, indicated, that moderate exercise raised the temperature of the internal parts of the body, as well as of the surface; and that severe and long continued exertion rather had a contrary effect, as in the instance above recorded. Supposing it to be generally so, it will serve to account for the impunity with which a person having taken the first mentioned degree, may plunge into a cold bath, and the fatal effect (sometimes witnessed) of doing the same, when the exercise has been of the latter description.

apology for introducing it. Other circumstances in addition recur to my mind, when reflecting on this subject, by which nature fits man to bear with impunity, and with little inconvenience, the heat of the hottest regions of the globe of which he is a native. Within the tropics, the cuticle appears to become thinner, so as to confine the animal heat less, excepting on the sole of the foot and palm of the hand, when exposed unprotected to the action of a hot surface, or subjected to much pressure, when it becomes exceedingly thick. I remember observing, with surprise a Negro, lying with his feet so close to a fire, that the soles were heated to such a degree, as to be almost scalding to my touch, whilst to him they merely transmitted an agreeable warmth, propitious to the comfortable sleep in which he was indulging. In the inhabitants of the tropics, the exhalant arteries of the skin appear to be unusually expanded, and the whole apparatus peculiar to this texture unusually developed; and I believe the blood itself is less viscid, more fluid, and flows more freely through the cutaneous and subcutaneous vessels, so as to promote perspiration; by that means contributing to the cooling of the surface; and being cooled itself, it contributes again, when it flows back to the heart, to the reduction of the temperature of the internal parts. I deduce this opinion of the blood being more fluid at a comparatively high temperature as 88° or 98°, than at a low one, as 38° or 48°, from experiments on the blood, shewing that a certain degree of cold thickens

blood, and that a certain degree of heat renders it more liquid; so that in the one state it is better fitted for torpid hibernating animals, and in the other for animals in whom the functions of life are performed with energy. Moreover, the constitutions of the inhabitants of the tropics, and more especially of the Africans, are different from the constitutions of the fair races of the temperate zone. The African enjoys the best health, is in the highest spirits, and capable of the greatest exertions, in hot moist regions, where the temperature is seldom below 80°, and is almost entirely exempt from those fevers of the intermittent and remittent type, which have been, and probably always will be, the scourge and destruction of Europeans in hot climates.* But reverse the situation, and place the African where the European recovers his lost energy, shakes off the languor of the tropics, and is restored to health and strength, there the African droops, becomes languid, feeble, and diseased, and soon sinks into the grave. And thus it is, no doubt, that each race is propagated and multiplies in the situation most suitable to the developement of its faculties and powers.

CORFU,
January 8. 1828.

* In regions more unwholesome to Europeans than the Maremma of Italy, where not one European in a hundred escapes fever, and the majority attacked die, a case of intermittent or remittent fever occurring among Africans is rare indeed.

ADDITIONAL

CASES AND OBSERVATIONS

ILLUSTRATING THE ORIGIN OF TUBERCLES.

By W. P. Alison, M. D., F. R. S. E., &c. and Joint Professor of the Institutes of Medicine in the University of Edinburgh.

The inquiries on the subject of scrofulous diseases, of which I formerly laid an account before the Society, were directed chiefly to the elucidation of the two following questions: 1*st*, Whether the scrofulous diathesis, or disposition to scrofulous disease, unfortunately so prevalent in our climate, is to be regarded as the result of the climate alone; or whether other and more remediable circumstances in the mode of life of those who become so affected, contribute generally and powerfully to its production; and 2*dly*, Whether the deposition of tubercles, so often the original cause of danger and death in scrofulous diseases, is to be regarded, in any case, or in any considerable number of cases, as an effect of inflammatory action.

On the first of these questions, I have since obtained information from various quarters, tending to confirm me in the opinion, that in regard to the tendency to scrofulous diseases, and particularly to those in which tubercles are formed, there is a greater difference between the inhabitants of large towns and of the country, than between the inhabitants of the warm and cold climates, at least of Europe; and therefore, that the general prevalence of the scrofulous diathesis is to be ascribed, rather to the modes of life which an advanced and artificial state of society implies, than to the circumstance of climate. But the information which I have collected on this head, is not yet so ample and satisfactory as I hope to be able to make it, before submitting it to the Society.

In regard to the second point, I should wish it to be remembered, that my object was, not to explain the whole history, and all the possible causes of tubercles, but only to investigate the question, which seemed of the greatest practical importance, Whether or not inflammatory action has, in any circumstances, the power to produce them? And on this subject I cannot help remarking with satisfaction, that although, at the time when I wrote my former paper, the most celebrated authors and teachers in the school of Paris, who had studied this subject minutely, Bayle, Laennec, Rostan, Louis, Velpeau, &c. were disposed to allow little or no influence to inflammation in the production of tubercles; yet those of the French pathologists who have attended

most minutely to the subject since that time, particularly Professors Andral and Cruveilhier, have adopted an opinion almost identical with that which I endeavoured to explain *.

The testimony of Andral is the more valuable, as his previous opinion in regard to the formation of tubercles appears to have been nearly the same as that of Laennec. The following sentence in the third volume of his Clinique Medicale expresses very nearly the opinion which my own observations have led me to form, regarding the connection of tubercular deposition with increased vascular action. "If the disposition to the formation of this new product is very strong, then the slightest local congestion of blood is sufficient to give occasion to it; wherever such congestion takes place, the same product appears; or what is called the tubercular diathesis is produced. If this disposition is less strong, it is requisite for the formation of a tubercle that the congestion of blood should be so considerable, and so permanent, as to amount to inflammation. But, when there exists no such predisposition, the most intense, and the longest continued inflammation, will not produce a tubercle †." For the last clause of this sentence, I should be disposed

* See Andral Clinique Medicale, t. iii. p. 13, *et seq.*; also an excellent "Essai sur les Tubercles," by a gentleman who has distinguished himself by his attention to the subject both at this school and at Paris, M. Lombard; and Cruveilhier's paper in the Bibliotheque Medicale, September 1826.

† T. iii. p. 24.

to substitute, " the kind of inflammation which is most generally excited has no tendency to produce tubercles." He remarks, in another place, that the condition which seems most conducive to the deposition of tubercular matter from inflammation, is not its intensity, but its long duration.

I shall now take the liberty of directing the attention of the Society to the facts which have occurred to me, both in the way of reading and of observation, since my former paper was read, and which seem to me to concur in establishing the proposition, That in certain constitutions, inflammation, acute or chronic, but most generally chronic, does frequently and directly lead to the deposition of tubercles.

I think it an important point, in the outset of this inquiry, and one which we may consider established by the researches of some of the pathologists of Paris, that, in so far as the most minute anatomical observations can inform us, tubercles are very seldom found in the bodies of children who are still born, or die very shortly after birth. On this point I trust chiefly to the statements of Dr Denis, lately Eleve Interne at the Enfans Trouvés at Paris. In the " Recherches d'Anatomie et de Physiologie Pathologiques sur plusieurs maladies des Enfans nouveau nés" of this author, we have a detailed account of 139 dissections of still-born, or very young children, which took place in the Hospice, under the eye of the author, in 1823; and after these extensive opportunities of observation, and after

having attended minutely to the statements of former observers, he was persuaded, that where they had described tubercles in the lungs in the fœtal state, or very soon after birth, they had been mistaken; and thought himself justified in asserting that, "On n'a pas encore trouvé jusqu'ici de tubercules pulmonaires avant les premiers mois que suivent la naissance; on commence seulement à les rencontrer dans des enfans de 5 ou 6 mois*. He then goes on to state (what agrees with my own observations), that even at this last age "les tubercules ne sont que rarement sous forme miliaire chez les enfans; leur substance infiltre ordinairement une masse considérable des poumons, ou seulement les glandes bronchiques." And in speaking of the abdominal diseases of new born children, he states equally decidedly, "Jamais, chez les nouveau nés, et meme rarement avant la première dentition, l'engorgement (des corps lymphatiques) ne se termine par une induration remarquable, par suppuration, ou *par une dégénérescence tuberculeuse*. Le Carreau (Tabes mesenterica) est une maladie qu'on doit rayer du cadre des affections des enfans en bas age †."

To the same purpose I find it stated by Velpeau, that both he and Breschet, (surgeon to the Enfans Trouvés at Paris) had frequently sought for tubercles in the fœtus, and never found them; and that though other observers, particularly Orfila and

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* Op. cit. † Op. cit. p. 118

West, had seen them, it was only in a small number of cases *.

We must, therefore, as I apprehend, necessarily suppose, that in by far the greater number of the very numerous cases in which tubercles are found in bodies of young children, the diseased actions by which they were formed had originated after birth, and seldom sooner than some months after birth,—parents transmitting to their offspring only the tendency to this kind of diseased action, and very seldom the actual disease. I would next recall to the recollection of the Society the observation of Magendie, that in those cases in which he had detected tubercles of the smallest size, and apparently in the earliest stage of the bodies of young children, they were surrounded by circumscribed vascularity. This I have myself observed, not uniformly, but certainly in a great many cases. I formerly stated likewise, that in cases of young children, which have come under my own observation, and where I was accurately informed of the whole progress of the symptoms, when tubercles have been found in unusual numbers, and been apparently the cause of unusually rapid emaciation, and early death, the first and chief symptoms of the disease have been decidedly those of inflammation, from which the patients never recovered, and of the consequences of which,

* Thesis ad Aggreg. p. 10.

judging from the symptoms, it was obvious that they died.

The two following cases, which have occurred to me since my former paper was printed, seem to me striking illustrations of this general fact.

1. Allan Mackintosh, a child aged two years and two months, living in a confined and ill-aired part of the town, had nevertheless been healthy from his birth,—had not had any of the contagious diseases of children, or any sickness of a day's duration, and had never had a cough, until the night of the 12th May 1824, when, after having been taken to some distance from town, and exposed to cold, he was seized with heat, restlessness, cough, and short breathing. I saw him on the 13th, after he had been prescribed for by one of the pupils attending the Dispensary. His pulse was then very quick and full; his face flushed, skin hot, and breathing much oppressed. Four leeches were applied that evening, and again next day; these bled freely, and the strength of his pulse and the heat of his skin were much diminished. The pneumonic symptoms continuing, however, in a less degree, leeches were again applied twice within a few days after this date; he also took laxatives, and on several days repeated doses of a solution of tartar emetic. About the end of the first week of his disease, the pectoral symptoms had abated very much, but his breathing continued short, though not difficult, and he had still cough, not severe, and generally dry. His pulse was still

very quick, and rather feeble. His bowels at this time were rather obstinately costive for a few days, and appeared to be pained at times. He had also slight spasms, and a tendency to coma, so as to excite suspicion of hydrocephalus, but these symptoms gradually went off, and the alvine evacuations became nearly natural. After this he had frequent irregular fits of chilliness, succeeded by heat and thirst, but without sweating. His tongue was generally rather dry, his appetite never returned, and he became weak and emaciated. In the beginning of the fourth week of his illness, his breathing became more short and difficult, and leeches were again applied, without any good effect, the dyspnœa continuing till his death, which took place on the 8th of June, the twenty-seventh day of his disease.

On dissection, the left lung appeared much condensed, and had on its surface many flakes of lymph, of a light yellowish colour, and disposed in irregular forms. When cut into, a part of its condensed substance had the common appearance of hepatization, but the greater part consisted of yellowish matter, partly diffused or "infiltré" through the substance of the lung, partly disposed in roundish tubercular masses, and partly also in long irregular flakes, which had exactly the same form, and were composed apparently of exactly the same substance, as those already noticed on the surface of the pleura.

Several of these tubercles, of the different forms now stated, were softened, and contained pus in

tubercles in many cases for their existence, or at least for their chief properties, on inflammatory action. 1*st*, The patients, previously quite healthy, suffered an attack of acute inflammation, from a known cause, very recently before death, and never recovered from that attack, but died manifestly of its consequences. A large deposition of tubercular matter was the chief appearance on dissection, and the disorganization produced in this way was so extensive, that it was quite impossible to suppose it to have existed previously to the inflammatory attack, when the patients appeared to be in perfect health. 2*dly*, The tubercles appeared closely connected with, and graduated insensibly into, the usual and acknowledged effects of inflammation. The tubercular matter which was diffused through the substance of the lungs, passed by insensible degrees, as I have seen in many other cases, into the adjoining hepatized induration; and the lines of tubercular matter in the substance of the lungs appeared so precisely similar to the contiguous flakes of lymph on the pleura, that I think no one could reasonably ascribe to them a separate and wholly different origin; while these last, again, had so much the common appearance of inflammatory exudation on that surface, that I think before the lung was laid open, no one could in either case have hesitated about calling them the effects of inflammation.

In the following case, which is almost precisely similar to one formerly communicated to the society, the symptoms were those of acute hydrocephalus,

and the appearances found were such as indicated clearly inflammation of the brain and pia-mater. The effusion on this last, however, though composed every where of the same *substance*, had in some points the usual *diffused form*, and in others the *form of tubercles*.

Pitcairn Smith, æt. thirteen months, December 1825. Had had running from the ears for a long time, and for three months an ulcer behind one ear, of scrofulous appearance, but without disease of the bone, and was always subject to slight spasms. Three weeks before death he became feverish, with screaming and vomiting, and soon after nearly comatose, with spasms; his bowels were rather loose, the pupils not dilated, the pulse quick and small. He was in this state when I first saw him; the coma abated, and recurred repeatedly before death.

On dissection, the ventricles of the brain were found much distended with serum. There were two large tubercles, the largest of the size of a hazelnut, in the medullary substance of the hemispheres. The pia-mater lining the base of the brain was very vascular, and on this vascular membrane, in front of the tuber annulare, were two patches of lymph, the one having the usual diffused form, and as large as a half-crown, and the other somewhat larger, and of precisely similar appearance, except that it was for the most part composed of little tubercular masses, set close together. The substance of the brain, just above this last, was red and softened.

The gradual and imperceptible transition of the matter constituting tubercles, into that which is clearly the effect of inflammation, is, of all the phenomena observable on dissection, that which appears to furnish the most direct evidence of the formation of tubercles by inflammatory action. I have no doubt of being able to form a series of preparations, in which a gradual transition shall be obvious, from the true hepatized condensation of the lung, through the intermediate changes of structure to which Laennec has given the name of grey hepatization, and of tubercular infiltration, to that kind of disorganization which consists for the most part of tubercles; and I am much confirmed in my opinion as to the close analogy of these structures, by finding that the researches of Andral have led him to the belief, that the appearance to which Laennec gave the name of "Tubercules infiltrés," is always to be regarded as the effect of a chronic inflammation *.

One important link in this series of preparations must consist of cases of the kind of tubercles called *granular* by Andral, and minutely described by him in the 3d volume of his Clinique Medicale, (p. 4. *et seq.*) These have just the external appearance and size of pretty large tubercles, but, when cut into, appear merely nodules of hepatized induration, confined to minute lobules of pulmonary substance. In a case which I attended lately, one lung was found

* See Lombard's Thesis, p. 32.

generally studded with tubercles of this description, while at its upper part only there was a pretty large irregular excavation, containing some clots of blood. The patient had died from repeated fits of hæmoptysis. This case illustrates the analogy of this to the more common form of tubercles.

I have seen several fatal cases of adults, in which almost the only morbid appearance found on dissection in the lungs was a deposition of common tubercles, so extensive as to have produced death before they had passed the first stage of their progress, and when their appearance was that called miliary; and in these cases both the external causes and the symptoms of the disease appeared to me to be decidedly those of inflammation; less acute, indeed, than where the hepatization of the lungs has been the chief appearance on dissection, but nevertheless abundantly well marked.

The most striking instance of this kind, of which I have a full account, is the following.

George Gordon, æt. sixteen, of delicate habit, and somewhat emaciated, was admitted into the Clinical Ward on the 6th of January 1823, complaining of frequent, severe, hollow cough, with copious, rather difficult, puriform expectoration; of pain under the sternum, and difficulty of lying on the right side; and of very short and difficult breathing. His pulse was 140, soft and compressible; his tongue of a florid red, with much thirst; his skin hot

and moist; his face flushed, but lips livid, and countenance very anxious.

He described having had, from exposure to cold, one morning before breakfast, a distinct febrile attack, with rigors, five weeks before admission; since which time the cough and shortness of breath, with thirst and heat of skin, especially at night, had continued and increased, particularly during the last few days; he had struggled, nevertheless, to continue his employment as a printer, and had been in the printing-office on the 3d of January, the fourth day before admission.

After being laid in bed, his pulse felt somewhat firmer, and the heat of his skin was 102°; he was bled at the arm, and became faint after ʒx had been taken, without any improvement on his breathing being perceptible. A blister was applied, and rose well, without any better effect. An expectorant mixture, ether draughts, and the digitalis, with a little wine, were used without benefit. He became delirious on the day after admission; his breathing continuing very quick and short, while his pulse became feebler, and skin cool; and he died on the evening of the 9th.

We found that he had been a patient in the hospital under Dr Spens, from the 20th October till the 11th November; he had complained, on admission, of slight febrile symptoms, with cough and pain under the sternum, of five days standing, and ascribed to cold. His pulse was 86. He used a blister and purgatives. On the sixth day after

admission, he was reported to have no pain of breast, and very little cough; on the eighth, to be free from complaint; and on the eleventh he was dismissed cured. His friends said, that previous to this time he had not been subject to any pectoral symptom whatever.

In mentioning his case at lecture, the day before his death, I stated, that from his emaciated and enfeebled appearance, from the duration of the symptoms, the peculiar hollow cough, the puriform expectoration, and the clean florid tongue, I had no doubt of his being phthisical, but that the dyspnæa was much more urgent than usual, at that or indeed at any period, during the ordinary course of phthisis; that the history of the case, and the symptoms we saw seemed to indicate, that this depended on an unusual degree of pneumonic inflammation being *combined* with the changes in the lungs that are peculiar to the first stage of phthisis; and that there was thus an injury done to the texture of the lungs, which must be inevitably and rapidly fatal; much sooner than the ordinary course of phthisis could be expected to be.

On dissection, there was a very slight deposition of lymph on the pleura pulmonalis of both lungs. The lungs themselves appeared externally to be healthy, and crepitated almost universally when cut; but they were studded throughout with an immense number of very small tubercles, exactly corresponding to Laennec's description of "Tubercules Miliaires." I had never before seen so very

general a deposition of these bodies, in a state so uniform, throughout the lungs. In the upper parts of the lungs only, they had the yellowish colour, opacity, and hardness, of the "Tubercules Crus;" and here some of them were nearly as large as peas. Only one was observed in a state of suppuration.

The proper pulmonary substance was of a somewhat redder colour than usual, and more serum than usual ran from it when cut; and in a few places, there was a little condensation or hepatization of it; but this was to a very small extent only.

I consider this case a very important addition to the set of cases adduced in my former paper, in which well marked pneumonic symptoms existed before death, and were never recovered from, and in which tubercles were the chief or only morbid appearances found on dissection.

We know, that on the 11th of November, this lad appeared quite free from complaint, having been kept in the hospital for some days before that time, after the catarrhal symptoms, for which he had come in, had disappeared. His pulse was then natural; and if his breathing had been difficult, or even peculiarly hurried, it must have been remarked. A fortnight after his dismissal he caught fresh cold; the complaint began with distinct rigors, followed by cough; this advanced insidiously for a time, but became attended with pain of breast, thirst, and other febrile symptoms, and then with dyspnœa; at the end of five weeks these symptoms were very urgent; his pulse 140, heat 102; his fever had no hec-

tic exacerbations or remissions; he died before the end of the sixth week; and had his body not been opened, I think the disease could have received no other name than a neglected pneumonia, occurring, no doubt, in a phthisical habit.

On dissection, however, the common unequivocal appearances of inflammation were to a small extent only; but the lungs appeared disorganised to a great extent, by tubercular deposition. These tubercles were so *very numerous*, that I think we can hardly suppose that they could be deposited, or could exist, in the lungs, without materially impeding their functions; they were (with the small exception already noticed) *so exactly in the same state of progress*, that their deposition must have been simultaneous; they were so small that it must have been recent; and besides, they were of the kind which the most experienced observers regard as the first stage of their formation. To me the influence seems almost irresistible, that they had been formed during the five or six weeks preceding his admission; and if so, then we know that their formation had been preceded and attended by the usual symptoms of pulmonary inflammation, occurring in a scrofulous habit, and advancing, probably on that account, more slowly than is usual.

If we reject this opinion, in regard to the origin of the tubercles, and suppose them to have existed in the lungs before the fatal illness commenced, then we must admit that *nothing* appeared in these lungs which could explain the urgent dyspnœa,

which was the chief symptom of that illness, and cause of the death of the patient; the degree of hepatization of the lungs, in this case, having been quite trifling, and the serous effusion in the lungs not more than is often seen when the respiration has hardly been affected before death.

It would appear, that tubercles seldom form in the lungs in so great numbers at once, as to be quickly fatal; and to this we must ascribe the rarity of cases of this kind, where there are so many tubercles, without any vomicæ or ulcers, in writings on phthisis. The case which I have seen described, that comes nearest to the above, in the symptoms and appearances, is one recorded by Bayle, —the second case that he has given at length. A postillion, æt. 24, previously quite healthy, was seized, on the 17th November, with a dry cough. Some days after he had a fall from his horse, and his breast was much hurt. From this time his breathing became short, and the cough was aggravated; these symptoms increased; he became hoarse; his legs became slightly swelled; his appetite continued, but he was unable for his employment. On the 7th December he was taken into the hospital; his breathing was then very short and difficult; he had much cough, with frothy expectoration; his pulse was very small, frequent and irregular; his tongue red, rather dry in the centre, but covered with whitish mucus on the edges; his voice almost gone, and countenance expressive of exhaustion; he died on the ninth, "dans un accés de suffocation;" *i. e.* the twen-

ty-second day after the commencement of the cough. He did not appear at all emaciated, and had very slight anasarca.

On dissection, the lungs were not adhering, and appeared healthy externally. When cut into, it is said merely that the substance of both appeared red, and loaded with innumerable whitish semitransparent grains, all about the size of a pin's head, more closely set together in the upper than in the lower lobes. This was the only morbid appearance.

It is obvious that the remarks I have made on the case of Gordon apply equally to this case; but my chief reason for quoting it is, to point out the difficulty which attends the view of the case which is taken by Bayle himself, who, believing that tubercles are altogether independent of inflammation, supposes these to have existed before even the cough had commenced. Twenty-three days before his death, says he, no medical man, examining this young man, who then enjoyed the most brilliant health, could have suspected that he was consumptive. Yet phthisis already existed in him, and *was already incurable.* Had he not met with the fall, the true phthisical symptoms, depending on the progressive changes of the tubercles already existing, would soon have appeared, and might have been long of running their course. But the fall had given a shock to the lungs, which *deranged their functions, and produced death.* It is needless to animadvert on the vagueness of this phraseology; but it is important to observe, that Bayle had no better

account to give of the cause of death in this case. And indeed, it is obvious that if we suppose, with him, that tubercles are never an effect of inflammation, we must suppose, in this case, *first*, that the tubercles caused no symptoms; and, *secondly*, that the cause of death left no marks; that the lungs were loaded with innumerable tubercles at the time when the young man appeared in the enjoyment of the most brilliant health; and that the affection of the lungs which supervened on the injury, and went on increasing, till it was fatal, three weeks thereafter, was merely a disturbance of the functions, not an alteration of the structure of the lungs; the only alteration of structure that was found, having been of the kind which this theory does not allow to be a product of inflammation, and cannot, therefore, refer to the agency of a cause of inflammation.

My belief, on the other hand, not grounded on these cases, but certainly strongly supported by its application to them, is, that an inflammatory action in the lungs, denoted first by the sudden attack of cough on the 17th of November, and afterwards aggravated by the injury of the chest, was the cause of the original deposition of the tubercles, or at least of their rapid progress and increase, within three weeks, from a state in which they were compatible with *the most brilliant health*, to a state in which they so far interfered with the functions of the lungs, as to cause *death by dyspnœa*. Even if we adopt the latter conclusion only, the question, whether the rudiments of the tubercles existed prior to the fatal

illness, or whether there only existed the constitutional disposition to their formation, seems to be divested of all practical importance.

Dr Denis records a striking case of very general tubercular deposition, chiefly found in the first stage at the time of death, in the lungs and bronchial glands, and on the pleura, peritoneum, and omentum, in a young child which had been exposed on the Boulevards of Paris in very cold weather, and was taken into the Enfans Trouvés, in a state of extreme depression from cold, seven weeks before death*; and I think no one can read his reflections on the case, without remarking how much he is embarrassed in drawing his conclusions as to its pathology, by the preconceived notion that tubercles could not proceed from inflammation; and therefore, that the great mass of them there found could not be ascribed to that barbarous exposure.

The affections of the intestines and mesenteric glands, which are so apt to occur in the course of phthisis, appear to me to furnish frequently unequivocal examples of tubercular deposition resulting, I do not say from active inflammation, but at least from increased vascular action and congestion of blood, which may be properly called chronic inflammation.

It has been indeed supposed by Laennec, that the colliquative diarrhœa of phthisis depends in ge-

* Op. Cit. p. 473.

neral on the existence of tubercles in the intestines, and of ulcerations formed in these tubercles; and it is certain, that in those patients who are affected with this diarrhæa long before death, these tubercles and ulcers in the intestines, as well as more or less of the tubercular degeneration of the mesenteric glands, are very generally found. But I have had several opportunities of observing, in cases where the colliquative diarrhæa, although well marked, has been of shorter duration before death, that the mucous membrane of the intestines has presented no morbid appearance, except general vascularity; and in other cases there have been only a few tubercles at the most vascular points; from which I conclude that the numerous tubercles and ulcers found in those cases where the diarrhæa has lasted long, are the consequence, not the cause, of that increased vascular action of the part, which produces the diarrhæa. And on examining the mesenteric glands in persons who have died of phthisis after various degrees of the colliquative diarrhæa, or the different mesenteric glands in the same subject, it has appeared to me obvious that the first change which takes place in them, is an increase of size and of vascularity; that the first tubercular deposition occurs at minute points in glands already thus altered, and that it is only by the gradual extension of these deposits, in glands larger and more vascular than natural, that the conversion of the glandular substance into the scrofulous cheesy matter is effected. The first part of these changes in the ab-

domen, in phthisical persons, is I think generally attended with pain, though not constant, and not always severe.

Another set of cases to which I would beg to refer, as furnishing strong evidence on this subject, consists of those where a disease, which ultimately takes the form, and exhibits the appearance, of tubercles, appears manifestly to have been excited by external injury. I have seen several examples of persons certainly previously healthy and vigorous, who have been subject to shortness of breath, and other pectoral symptoms, only from the time of their receiving such injuries on the chest, as confined them to bed for some days together; and in whom the disease has ultimately turned out to be tubercular deposition, chiefly or solely situated in the immediate neighbourhood of the parts injured. The following case appeared to me the most striking of this kind that I have seen.

A boy, æt. twelve, a year before his death was severely injured on the *lower part of the left side of the chest* by a fall. According to the account of his parents, he had been quite free from any pectoral complaint before that time, but had been confined to bed for some weeks immediately after the injury; had never recovered his strength, and his breathing had always been short, insomuch that he had seldom been out of doors after that time. He died of confluent smallpox, without suffer-

ing nearly so much from dyspnæa in the course of that disease as many others do. On dissection the *lower lobe of the left lung* was found adhering to the pleura costalis, and completely condensed, chiefly by red hepatization, but partly by circumscribed tubercles, which were of the yellow colour and cheesy consistence, several of pretty large size, and one of an irregular form nearly as large as a hazel-nut. There were no other tubercles, and no other morbid appearances in either lung.

From the history of this case I think we cannot doubt that the partial condensation of the lungs had resulted, for the most part, from the inflammation that had been excited by the injury. And if we do not regard the tubercles as likewise the effect of the inflammation which had condensed the pulmonary tissue around them, we must make two suppositions, both highly improbable; *first*, that the tubercles had pre-existed in that part of the lung only which is known to be least subject to their deposition; and, *secondly*, that this unlucky portion of the lung, which was already exclusively the seat of tubercles, had been likewise that which alone sustained injury from the fall.

The very great frequency of phthisis in masons, in this country, has been already remarked, and it was stated that, in many of these cases, occurring at a somewhat advanced period of life, less tubercular disease is found on dissection than in younger persons who die of phthisis. Since that time I have met with few cases in which more or less of tuber-

cles were not found; and I have seen several fatal cases, under the age of forty, where there was a very great number of them, in men originally of robust habit of body, and who were free from pectoral complaints up to the age of thirty. If we suppose, as I think we must do, that the phthisis of masons is chiefly to be ascribed to the irritation of the particles of sand inhaled, we may regard the undoubtedly peculiar prevalence of the disease among them as a proof that long continued irritation by foreign bodies may occasion the developement of tubercles in many, in whom they would not otherwise have appeared.

The question, whether tubercles can be excited by external injury, and consequent inflammation, is obviously susceptible of illustration from experiment; and the experiments of Cruveilhier on this point, published in the Nouvelle Bibliotheque Medicale for September 1826, are so satisfactory as to leave no doubt on my mind of the correctness of the conclusions above drawn from the different pathological appearances I have described. He injected mercury into the femoral artery of a dog, which was killed some days after this had been done. He then found in the limb thousands of little miliary tubercles, quite regularly formed, and each surrounding a very minute globule of the mercury. He injected, also, by an opening in the windpipe, ʒij of mercury into the lungs of a dog. The greater part was rejected by coughing: the animal became apparently phthisical, and died emaciated at the end

of a month. The lungs were found " farcis de tubercules isolés et aglomerés, ayant tous les characteres des tubercules miliaires *.

Similar experiments were performed in the Royal Infirmary here, in the beginning of this winter, by my friend Dr J. P. Kay (author of the paper on the Physiology of Respiration, which was read to this Society, and afterwards published in the Medical and Surgical Journal for January last); and the results of some of these I can now exhibit to the Society.

A small globule of mercury was introduced into the tracheæ of each of the rabbits which were the subjects of the experiments, by small incisions, which soon healed. This produced at first much coughing, which occasionally returned afterwards; but the animals did not appear much incommoded, and took food well; their breathing, however, appearing rather hurried.

The first rabbit was killed eight days after the introduction of the mercury; and it is singular that the appearance of clusters of tubercles was more distinct in this than in any of the others. These lungs are preserved, but the colour of the tubercles does not now contrast with that of the pulmonary substance as before the lungs were put in spirits, and several of the clusters were destroyed in examining them minutely. The appearance of several of the clusters was so exactly that of tubercles

* Nouv. Bibl. Med. September 1826.

in their early stage, that my learned colleague Dr Monro, and several other friends, gave them that name without hesitation, before they were aware how they were produced; but on cutting into them, each contained in its centre a minute globule of mercury.

It is to be observed farther, that, in several parts of these lungs, there was partial hepatization.

The appearances found in the other rabbits are accurately described by Dr Kay in the following paper.

"The *second* rabbit, after appearing drowsy and oppressed for a day, was found dead eight days after the operation.

"The upper lobe of the left lung was discovered hepatized in the whole of its anterior border, through which were scattered small granular bodies, of a yellowish colour, each containing in its centre an extremely small globule of mercury. They had all the external characters of ordinary tubercles. In the centre of this lobe existed a cavity, containing a soft caseous substance, surrounded by a firm membranous cyst. It was about two and a-half lines broad, and three in length. Large globules of mercury escaped from this cavity. In the posterior part of this lobe was an extremely small cyst, containing neither tubercular matter nor a mercurial globule.

"The lower lobe of the left lung was also hepatized in the whole of the anterior border, through which numerous small, granular, and apparently tubercular

bodies were deposited, containing generally a small globule of quicksilver in their interior. The superior lobe of the right lung was, in some portions, hepatized. A greyish, and apparently tubercular, substance was infiltrated into portions of the pulmonary texture. In the anterior part of this lung, existed a large encysted cavity, filled with a soft, yellowish, granular mass, of a caseous consistence, resembling the matter of softened tubercle. The cyst was distinct, apparently well organised, being of firm texture; and the cavity was capable of containing a large pea. In the lower lobe of this lung, tubercular deposition also existed, surrounded by hepatized structure. Several bronchiæ were much dilated, and a similar substance was deposited round their parietes.

"The other rabbits were killed four weeks after the operation.

"*Third Rabbit.*—In the upper lobe of the left lung, a large globule of mercury was found imbedded in a quantity of soft and greyish lymph, surrounded by a distinct cyst. Many globules of mercury were found scattered in the lungs, without either hepatization or deposition of lymph. The lung, however, appeared emphysematous, and some dilated bronchiæ were observed. In the right lung the appearances were similar. The globules generally were found in the thin border of the lung, and appeared to have excited little inflammation there. Some partial condensation, and a few granular bodies resembling tubercles, were observed.

"*Fourth Rabbit.*—Much hepatization had been

produced in this lung. Dilated bronchiæ were observed in many portions, and in the extreme thin border of the tissue many globules of mercury existed, unsurrounded by hepatized structure or lymph, but apparently contained in enlarged cells. In the centre of the lung, as before, they were, in some cases, surrounded by lymph, which had the form of tubercles.

"*Fifth Rabbit.*—The general appearances in this lung resembled those described in the others; but, at the extreme thin border of the lung, a row of globules of mercury existed, not simply contained in air-cells, but surrounded each by a very evident thin deposition of lymph."

The tubercular appearances in these lungs (which were always slighter than in the first), were also much destroyed in examining them, and two small portions only have appeared worth preserving; the one shewing an ulcerated cavity, with a distinct cyst resembling that of a tubercular excavation; the other shewing a row of small tubercles (each no doubt containing a little globule), which have formed along the edge of one lobe, apparently in the cellular substance just beneath the pleura. In this situation the thickness of the lymph surrounding the globules is less than where similar appearances were found in the central parts of the lungs.

I consider the results of these experiments (coinciding as they do with those related above), as sufficient proofs, that, by the inflammation which is ge-

nerated by the irritation of foreign substances, depositions of lymph may be excited in the lungs of these animals, which present all the external marks, and which appear, in some instances, to run the usual course, of tubercles.

If we consider it established that masons and others, who are in the habit of inspiring irritating particles, are much more subject than other persons to the deposition of precisely similar matters in their lungs, I think we cannot doubt that the deposition is produced in the same manner; and we know that the matter there deposited produces the ordinary symptoms, and undergoes in general the ordinary changes of phthisis.

It may be said, that if this kind of irritation, acting on the lungs of healthy rabbits, is supposed to produce a deposition of tubercles, resembling those which we distinguish in the human body as scrofulous, we depart from the doctrine generally received among physicians, and illustrated in the former part of this paper, that a peculiar general scrofulous diathesis is much concerned in the production of tubercles in the human body.

I would answer, 1*st*, That if it be true, as matter of fact, that mechanical irritation of the lungs will produce deposits in the lungs, not differing in appearance from scrofulous tubercles in their early stages, we must not set aside that fact, because it does not accord with our preconceived notions of the pathology of the diseases, in which similar deposits take place in the living body.

But, *2dly*, It was stated already, as the result of the observations of Andral, that the conditions which appear most requisite, in order that inflammation may generate tubercles in the living body, are the *long duration* and *slight intensity* of that inflammation. It is highly probable that the scrofulous diathesis disposes inflammation to terminate by tubercular deposition, simply by giving to it these characters,—keeping it up long, and not permitting it to rise high.

Now it is very easy to conceive, that the continued irritation of a minute globule of mercury imbedding itself in a portion of pulmonary substance, or the repeated irritations of particles of sand inhaled, may furnish just the same condition to the inflammation which they excite,—as is given in other cases by the peculiar strumous diathesis,—rendering the inflammation long continued, but of slight intensity. When this cause is habitually applied for a long time, and during youth, to the human species, as in masons, I believe that very few cases exist, even of constitutions previously strong and healthy, in which more or less of tubercular deposition is not excited.

It is to be observed, that the appearance of tubercles is by no means the only change which was determined in the lungs of these rabbits, by the irritation of the mercury. In each of the cases some portions of the pulmonary substance were found hepatized,—probably parts which had been irritated by larger masses of the mercury than those which

caused the deposition in the tubercular form. Such larger masses were in fact found, inclosed in enlarged bronchiæ, in some of these hepatized portions, but in general they appeared to have escaped into the cellular substance close on the pleura.

I would farther observe here, that in asserting that inflammation does in certain circumstances cause deposition of matter, which takes the tubercular form, I do not assert that such products of inflammation must always necessarily run the course that is commonly followed by tubercles. It has been rendered almost certain by Dr Baron and others, and I have seen various cases illustrating the observation, that the subsequent course of substances, which in their commencement have all the characters of common tubercles in the lungs, may vary remarkably. I have no doubt that the course of tubercles, once deposited, may vary according to the age and constitution of the patient, according to the diseases which may subsequently attack him, and according to the texture in which they have been formed; and on another occasion I hope to be able to shew, that the pathology of the earlier stages of diseases, generally regarded as very different from scrofulous affections, does not differ materially from that of scrofulous tubercles deposited in certain circumstances of inflammatory action.

In the mean time, I think the facts stated in this paper, and in the latter part of my former one, may be regarded as sufficient evidence of the proposition, that scrofulous tubercles may be, and often

are, deposited in consequence of inflammatory action; and therefore, that as, on the one hand, scrofulous diseases may be in many cases prevented by applying the *tonic regimen* to persons of feeble constitution, but not yet affected with actual disease; so, on the other, they may also be frequently prevented by the early and prudent use of the *antiphlogistic remedies* in those in whom the slight inflammatory complaints so often preceding them have already appeared.

This general conclusion does not differ from that which I believe the greater number of practitioners have been induced to form, from their own practical observation; but it seems to me of great importance to have attained to it by pathological inquiries, founded on fatal cases,—because, until the pathological question as to the frequent dependence of tubercles on inflammation is determined, no observations on the effect of the antiphlogistic remedies, where tubercular disease is apprehended,—if made on cases that terminate favourably,—can be held to be conclusive on the subject.

SUPPLEMENT

TO THE

ARTICLE ON THE

OBSTRUCTION OF THE CANALS OF THE ARTERIES,

CONTAINING TWO CASES OF LACERATION OF THE POPLITEAL ARTERY, FROM DISLOCATION OF THE KNEE-JOINT.

By JOHN W. TURNER, Professor of Surgery to the Royal College of Surgeons, &c.

SINCE the Article on the Spontaneous Obstruction and Effects of Laceration of the Arteries, contained in this volume, was printed, an opportunity has occurred to me of examining the popliteal arteries in two cases of severe, and rather uncommon, injury of the knee-joint, in which the condyles of the femur were dislocated backward,—the integuments and soft parts of the ham had given way,—and the vessels in it had been violently elongated and lacerated. One of the cases occurred at the Royal Infirmary here, under the care of Professor Ballingall; the other was in a patient of Staff-Surgeon Stewart, Principal Medical Officer

in Scotland, and Dr Anderson, Surgeon of the 92d Regiment. I feel much indebted to these gentlemen for the obliging manner in which they have communicated the particulars of these cases, and permitted me to publish them.

The following is the statement given me by Dr Stewart: "Private James Kennedy of the 92d Regiment, a strong muscular man, twenty-four years of age, having been confined to barracks, and not allowed to go into town, on the 8th of April made an attempt to force his way out of the Castle, by leaping out at an embrazure on the south-east face of the fortification, a height of about thirty feet. The fall caused a compound dislocation of the left knee-joint. When he was brought into hospital, the condyles of the femur were observed to be thrust through the muscles and integuments of the ham down over the head of the tibia. His countenance was pale and ghastly, and the whole system in a state of great depression and debility. The limb was quite cold, and no pulsation could be felt in the popliteal artery when the finger was placed over its course, between the condyles; and the idea was, that the vessel had been ruptured. From the very extensive injury done to the knee-joint, it was too evident that there was no chance whatever of saving the limb. As soon, therefore, as the system had sufficiently recovered, to allow the patient to undergo an operation with safety, which was about two hours after the receipt of the injury, Dr Anderson, the surgeon of the regiment, amputated the limb

by the circular incision. The femoral artery was the only vessel that required to be tied. The stump is nearly healed; and the patient has been altogether exempt from fever.

On examination of the knee-joint, all the ligaments were found torn across, with the exception of the internal lateral ligament; the tendon of the popliteus muscle was also torn from its insertion; and partially the head of the gastrocnemius externus. There was a small fracture of the head of the tibia; the joint was filled with blood; and the two internal coats of the popliteal artery were ruptured.

ALEX. STEWART.

April 21. 1828."

Being desirous to ascertain exactly the effects produced on the artery, by the violent elongation which it must have suffered, I inspected it carefully along with Dr Knox, the Conservator of the Museum of the College of Surgeons. The outer surface of the vessel was found entire throughout its whole course in the ham; but, opposite to the projecting condyles of the femur, the artery was, for a third of an inch, suddenly constricted to about one-third of its diameter above and below. About half an inch above this constriction, the inner coats of the artery terminated abruptly in its whole circumference, in a slightly ragged edge. Between this edge and the constricted part, the internal surface of the outer coat was exposed, somewhat rough, having adhering to it some fragments of the inner

coats, and ecchymosed. At the seat of the stricture, the canal of the artery was impervious; and, on slitting it up, the obstruction was found to be produced by flaps of the inner coats separated from the external, and irregularly coiled up in the vessel. At this part the external coat was thin, and its fibres drawn together, so that it could not be expanded to its usual breadth. The popliteal vein and nerve were entire.

The particulars of the other case are contained in the following letter, with which I have been favoured by Dr Ballingall:

"My Dear Sir,—You are most welcome to make use of the preparation of ruptured popliteal artery, which I deposited in the Museum of the College of Surgeons some time ago, if it can in any way illustrate your interesting and valuable paper, on the Sudden Spontaneous Obstruction of the Canals of the Larger Arteries.

"The patient from whom it was taken, a middle-aged female, was brought into the Royal Infirmary with a deep lacerated wound in the ham, through which it was stated, in a written report from a professional gentleman, that the condyles of the femur had protruded, and that the knee-joint had been completely dislocated. The injury had been produced by a fall, which this poor woman had suffered, while carrying a heavy load of coals on her back. There was no hemorrhage from the wound; but a

good deal of swelling, and inflammation of the contiguous parts, extending up the whole thigh, had supervened, and was attended with much constitutional fever, which rapidly increased, and carried off the patient ten days after the accident.

"On the dissection of the limb, although the crucial ligaments of the joint were torn, the capsular ligament was found to be entire. The blood-vessels of the ham were torn through; but as I made but a cursory examination of the parts at the time of the occurrence, and have not examined them more minutely since, you are probably better acquainted with the state of the artery than I am. I remain, &c.

GEORGE BALLINGALL.

QUEEN STREET,
16*th April* 1828."

Availing myself of Dr Ballingall's permission, with the assistance of Dr Knox, I examined minutely the state of the parts which are preserved; and the following are the appearances which presented themselves.

The large vessels of the ham are completely torn through, and their extremities, about two inches apart, are each surrounded by a bulb of very dense cellular substance, intermixed with fat and lymph, which adheres firmly to their coats, and cuts like cartilage. The vein near its torn orifices is contracted, and its coats thickened by interstitial deposition, and the tube of both the superior and infe-

rior portion is filled by coagulum for about two inches. The coagulum is friable, and, internally, of a brown colour, apparently showing that it consists of coagulated blood. The clots fill the canal of the vein, but are without difficulty detached from its surface, except where some branches enter, also filled with coagulum, continuous with that within the main trunk. About half an inch from each orifice a valve is seen; and, opposite these valves, the tube of the vein is slightly swollen out, and the coagulum somewhat larger than in the other parts. The portion of the popliteal artery above the rupture, about four inches of which have been preserved, is diminished in size, and, for an inch from its extremity, adhered firmly to the surrounding cellular substance, and to the vein. The orifice was so completely covered by, and incorporated with, the condensed cellular substance, that it was not possible to distinguish its situation. On slitting up the artery, it was found to terminate half an inch higher than the extremity of the vein; and its canal contracted and obstructed for more than two inches. For half an inch above its extremity no remains of the two inner coats can be perceived; and the inner surfaces of the external coat appear to have adhered to each other. Above this, for about an inch and a half, the circular rugated appearance of the inner coats is distinct, and the canal is filled by a tough white coagulum, which adheres very firmly to the coats of the artery, particularly at various points, where it appears to send

resting case of lacerated humeral artery, quoted from a paper published by Mr Guthrie *. I gladly avail myself of the present opportunity to repair this omission, in relation to a work which derives so much value from the full and accurate account it contains of every thing important to be found in the writings of preceding authors, with regard to the subjects of which it treats.

23. CASTLE STREET,
24th April 1828.

* Hodgson, p. 461.

☞ The Reader is requested to correct the following errata in the Article to which this is a Supplement.

Page 159, line 7, *for* "does uniformly" *read* "does not so uniformly"

Page 167. line 13, *for* "nor" *read* "or"

Fig. 2nd

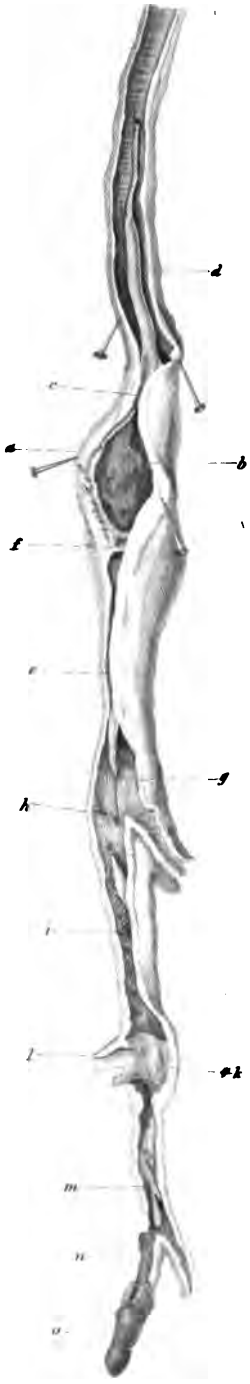
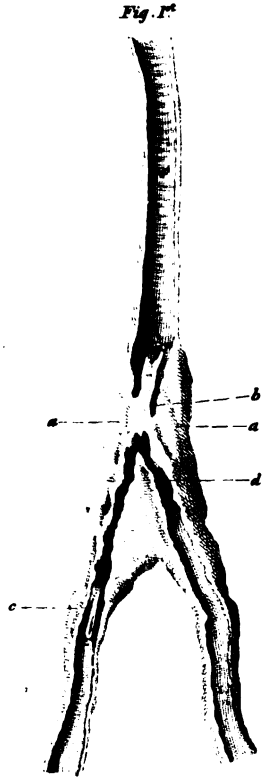


Fig. 1st



W. H. Lizars

Fig. 1st

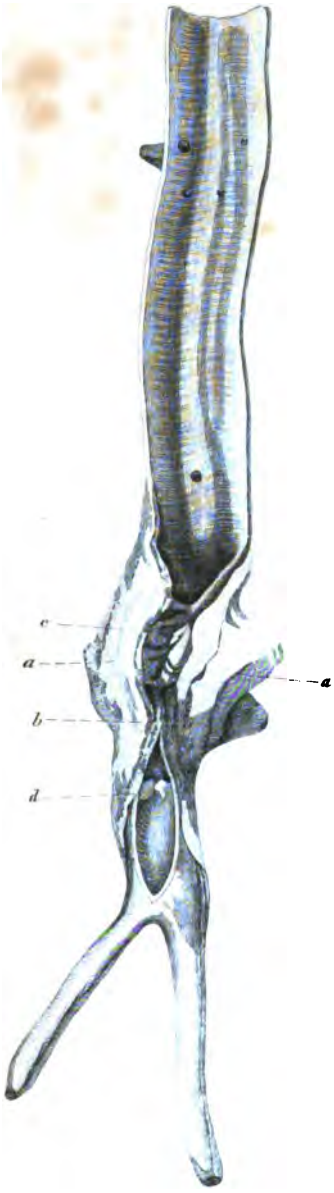


Fig. 2nd

W.H. L.

PLATE III

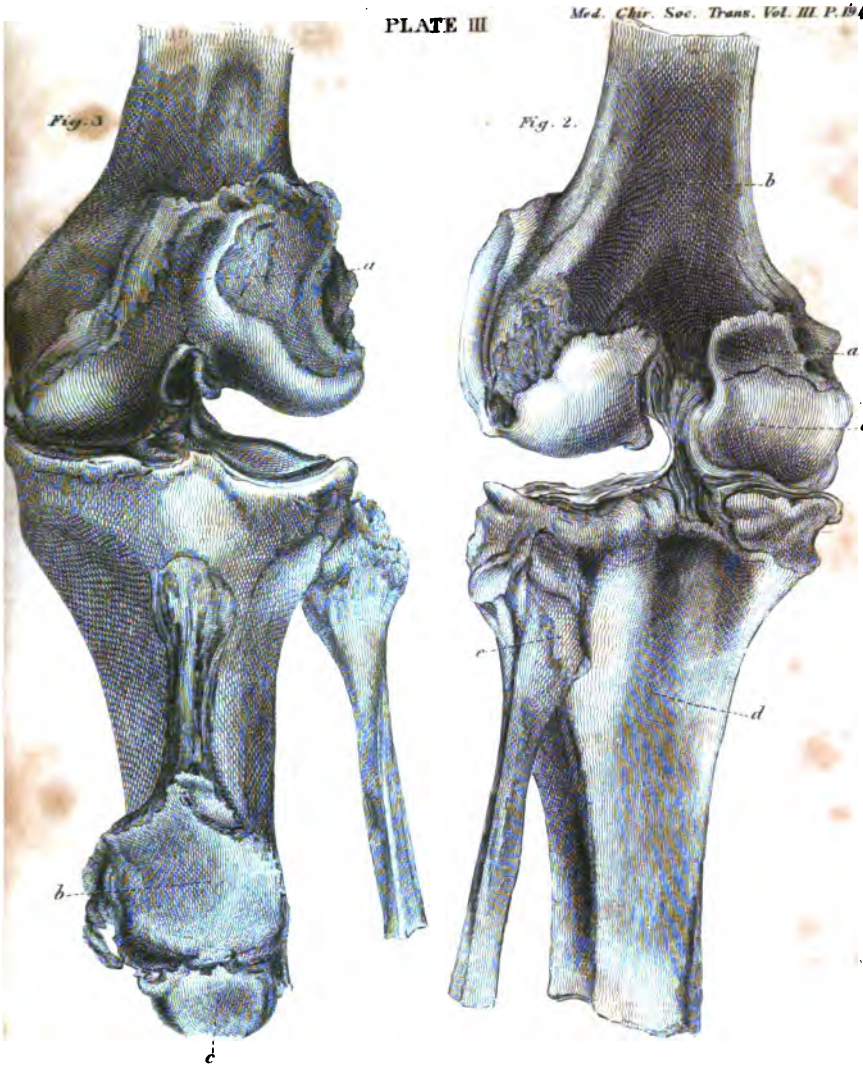


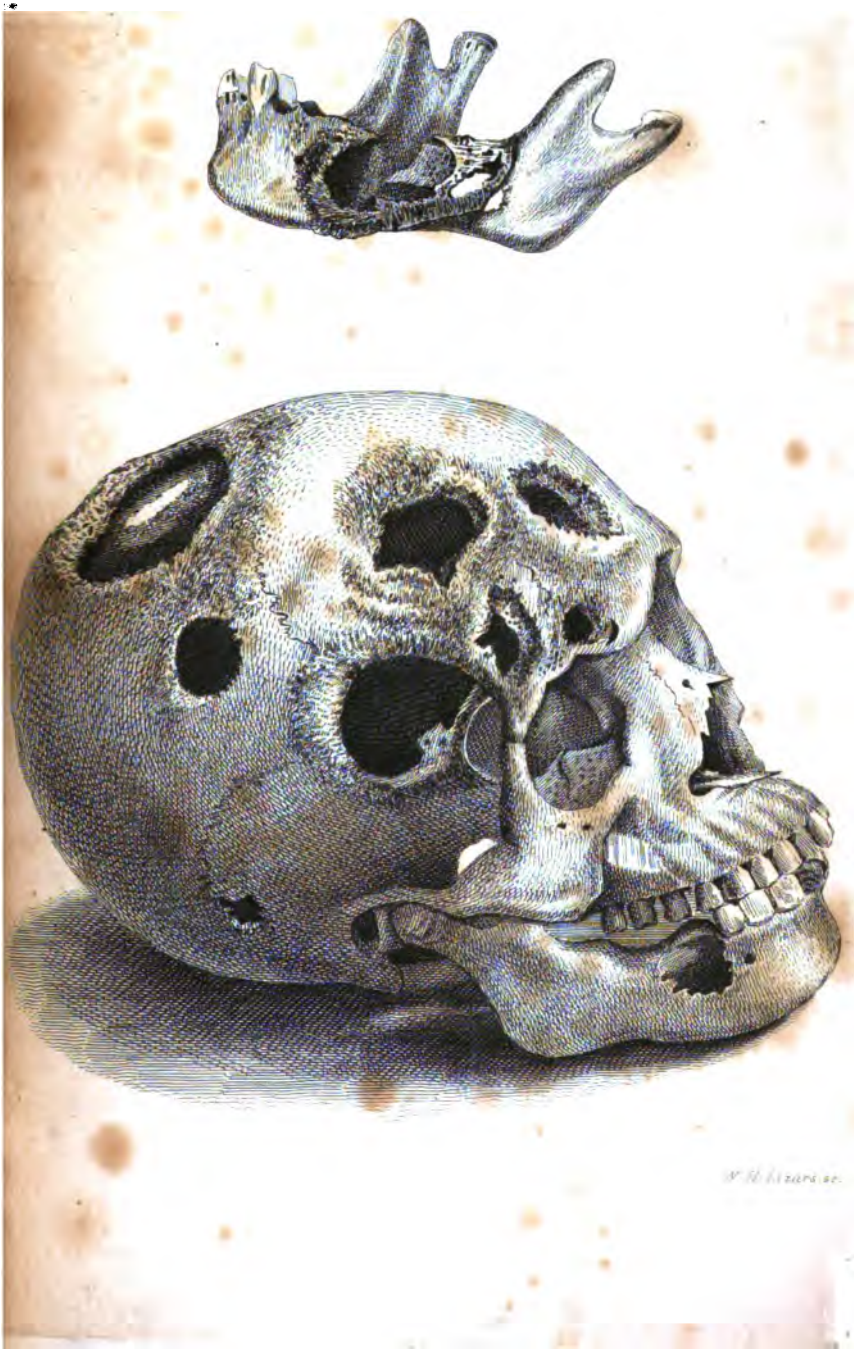
Fig. 1.

T. W. J. del.

W. H. Lizars sc.

PLATE IV.

Edin.r Med. Chir. Jour. Vol.III.p.252



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OF THE

MEDICO-CHIRURGICAL SOCIETY

OF

EDINBURGH,

INSTITUTED 1821.

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PLATE V.

Fig. 1.

52

OBSERVATIONS

ON

PAINFUL SUBCUTANEOUS TUBERCLE,

WITH CASES AND HISTORIES OF THE DISEASE.

By William Wood, Fellow of the Royal College of Surgeons, and F. R. S. E.

In the year 1812, I ventured to bring under the notice of the medical profession, through the means of the Edinburgh Medical and Surgical Journal, published in July of that year, some observations on a disease which did not appear to me to have met with that attention from medical men to which I considered it entitled, both on account of the singularity of its symptoms, and of the severity of the suffering to which it gives rise.

Not having been successful in finding any mention of this disease, in the writings of authors, previously to the publication of my communication, I drew up its history from cases which I had met with in private practice, and from some others, with which I had been favoured by my medical friends here: and from these sources I was enabled to give a detailed

account of the disease, as it occurred in eight females.

From the similarity in the symptoms and progress of the complaint in all these cases, and from their being essentially different from those of any other, I was induced to consider it as forming a distinct species of tumour; and, with the view of attracting the attention of medical men to the subject, that additional observations might be collected, and that an accurate examination might be made into the nature of the morbid part, I ventured, at the suggestion of my friend Dr Thomson, to give to it the name of *Painful Subcutaneous Tubercle.* This name was adopted as being descriptive of the seat of the tumour, and of its principal symptom; but not involving any theoretical opinion in regard to its nature. I was anxious, indeed, both in describing the disease, and in giving to it a name, to avoid doing any thing which might lead to the idea that its real nature had been ascertained: because, although, from the symptoms, and more particularly from their bearing a strong resemblance to those of Neuralgia, I was induced to believe that the tubercle would be found to be intimately connected with the nervous system, I had not been able to satisfy myself in regard to the texture in which the alteration of structure had taken place; or as to the mode in which the tumour had been connected with the nerves.

"The disease consists in the formation of a lump or tubercle, of a peculiar nature, in the subcutaneous

cellular substance. This tubercle is met with in different parts of the body, but most frequently in the extremities. It is extremely small, generally of the size and form of a flattened garden pea, and, in none of the cases of which I have been able to procure a distinct account, larger than a coffee-bean. It is of a firm consistence, and is apparently quite circumscribed, being situate loosely in the cellular substance, immediately under the integuments, which retain their natural colour and appearance.

"In the greater proportion of cases, there is no visible appearance of disease whatever, and it is only when the surgeon applies his finger to a particular spot pointed out by the patient, that he becomes sensible of the existence of the tubercle. In some few cases, however, although small, it is so superficially seated as to form a visible prominence.

"As in all the cases with which I am acquainted, the tubercle had attained nearly its full growth before its presence was detected, I am unable to say whether it is originally of slow or rapid formation, but having acquired a certain size, it remains nearly stationary, undergoing hardly any perceptible increase of bulk, even in the course of a great many years; nor does it ever shew any tendency to affect either the skin or surrounding cellular substance. In one only of the patients whom I have seen, or of whose disease I have procured an account, has there been found more than one of these tubercles, and in that person there were present no fewer than three at the same time.

"Trifling as the diseased part is, in point of size and appearance, it becomes the cause of very severe and even of excruciating pain. So strongly is this pain represented by the patients, that we might be apt to imagine their statement exaggerated, did we not find them all concurring in the same representation, and most of them willing to submit to any operation that may be necessary to remove the cause of their pain. Two women in the lower rank of life came to me, even from a distance of above 30 miles, to have a consultation about this disease, and both of them expressed their willingness to submit to any temporary pain, however severe, which might remove their complaint.

"The pain to which this disease gives rise is extremely acute in the tubercle, and extends from it to a considerable distance along the neighbouring parts: it is not constant, but occurs in paroxysms. In general, at the commencement of the paroxysm, the pain is slight, but gradually increases till it becomes excruciatingly severe, and it goes off in the same gradual manner, leaving the parts in the neighbourhood of the tubercle, for some time afterwards, sore to the touch, as if they had been bruised. The paroxysms vary in duration from ten minutes to upwards of two hours; but they seem to increase both in frequency and severity, in proportion to the length of time the disease has existed.

"Some of the patients have occasional intervals of ease for days or even weeks; in others the paroxysms occur several times in the course of one day. They

generally come on spontaneously; but in one of the cases which I met with, they were sometimes induced by the friction of the clothes along the surface of the tubercle. They frequently attack the patient when asleep, in which case he is suddenly awoke by the severity of the pain.

"The degree of pain produced by touching the tubercle is different in different cases; all the patients whom I have examined allowed it to be freely handled, *in its ordinary state*, without feeling much uneasiness, but complained of great aggravation of the pain, from either the tubercle or surrounding skin being even slightly touched *during the paroxysm*. Acute pain is produced at all times, by the tubercle being accidentally struck against any hard substance. One lady, of whose case I shall give a detailed account, conceives that the sensibility of the tubercle is materially affected by every change in the weather, whether from heat to cold, or from cold to heat. Several of the patients have stated, that they are sensible of an increase in the size of the tubercle *during the attack of pain*, and some of them have occasionally observed, at the same time, a degree of discoloration of the skin covering it, which became of a purplish or bluish cast; and although I have had no opportunity of ascertaining the truth of these statements from my own observation, I have no reason to doubt their accuracy.

"It is a singular circumstance, that in all the cases which have come to my knowledge, with perhaps one exception, this species of tubercle occurred in

females. It does not appear to be confined to any particular age, but it is frequently met with at an early period of life, and I have known it remain nearly unchanged for upwards of eighteen years.

"From the very severe and almost constant suffering to which the patient is exposed, the tubercle frequently becomes the subject of operation, and fortunately it may be extirpated with perfect safety, no unpleasant symptom having ever, so far as I know, been produced by the operation. The patient becomes free from all pain and uneasiness, as soon as it is removed, and, so far as experience yet goes, there seems to be no tendency to a return of the disease. In removing the tubercle, it is found to be quite detached from the integuments, and to be but loosely connected with the surrounding cellular substance, both of which are, to all appearance, perfectly sound. From this circumstance it is unnecessary to take away any portion of the skin, and only a very inconsiderable quantity of the cellular membrane. The wound frequently heals by the first intention, and, even in those cases in which suppuration takes place, the cure is seldom prolonged for any considerable length of time. On dividing the tubercle with the knife, after it has been removed from the body, it is found to be of a pretty firm consistence, and it exhibits an uniform structure, somewhat resembling cartilage in appearance, but it is by no means so hard *."

* Edinburgh Medical and Surgical Journal, vol. viii. p. 283.

Soon after the publication of the Journal for July 1812, containing this history of the disease, with a detailed account of eight cases, I was informed, by some learned medical friends, that, although they were not aware of the existence of any very full or accurate general history of this complaint, it had been mentioned, and individual cases of it had been described, by several authors. I availed myself of the earliest opportunity of publishing the additional information which I had thus received, in a second communication inserted in the same Journal for October 1812; and in it I was enabled, by the references which I had obtained, to extract a short but distinct account of the disease from the latter editions of Cheselden's Anatomy, and a very accurate description of the appearance of the tubercle, from the celebrated Camper's work, entitled, Demonstrationes Anatomico-Pathologicæ.

"Immediately under the skin of the shin-bone," says Cheselden, "I have twice seen little tumours, less than a pea, round, and exceeding hard, and so painful, that both cases were judged to be cancerous; they were cured by extirpating the tumour: but what was more extraordinary, was a tumour of this kind, under the skin of the buttock, small as a pin's head, yet so painful that the least touch was insupportable, and the skin for half an inch round was emaciated; this, too, I extirpated, with so much of the skin as was emaciated, and some fat. The patient, who, before the operation, could not endure to set his leg to the ground, nor turn in his bed

without exquisite pain, grew immediately easy, walked to his bed without any complaint, and was soon cured *."

Camper's description of the tubercle is in the following terms: " Non raro in nervis cutaneis tubercula parva ac dura observantur, quæ vera ganglia sunt, pisi magnitudinem licet non excedant; dies tamen noctesque acutissimis lancinantibus doloribus ægros torquent: externis remediis non cedunt, scalpello igitur ea attingere oportet. Franequeræ ex cubito fœminæ tale, plaga facta, sustuli, quod ramo musculo-cutanei nervi adhærebat: post operationem optime se habuit. In subcutaneis nervis frequenter esse videntur. Amstelædami simile ganglium genu mulieris occupans, eodem modo sanari curavi. In viris plus semel ea vidi: albicant intus, cartilagineæ duritiæ sunt, renitentia, et intra nervorum tunicas sedem habent †."

I gave a full account, also, of a very interesting case described by Dr Bisset ‡, of two cases published by Mr John Pearson §, and I alluded to two additional cases which had been met with here, with the history of one of which I had been favoured by my late respected friend Dr William Brown; and the other I had seen along with my friend Mr Newbigging.

---

* Cheselden's Anatomy, 10th Edition, p. 136.

† Camper, Demonstrationum Anatomico-Pathologicarum Liber Primus, p. 11.

‡ Memoirs of the Medical Society of London, vol. iii. p. 58.

§ Medical Facts and Observations, vol. vi. p. 96.

In the case reported by Dr Bisset, of what he terms "An extraordinary irritable sympathetic tumour," the tumour appeared originally in the form of a small pimple, of the colour of the skin, on the outside of the left leg of a girl of thirteen years of age; in and about which pimple she usually had some little uneasiness, immediately before a great fall of rain or snow, and in very windy weather. The tumour remained in this state till soon after she first conceived, when it increased to the size of a large filbert, and became in the highest degree irritable. The patient now began to be affected with a violent periodical pain in it, which recurred twice or three times, and sometimes oftener, in 24 hours, at unequal and uncertain intervals, the duration of each paroxysm often varying a little, and never exceeding one hour. The pain darted, when most violent, to the origin of the tibialis anticus, and from thence often upwards to the spine of the ilium. The pain was instantly excited also, during the pregnant state, by the tumour being rudely touched with a finger, or with the skirts of her petticoat; but these accidental paroxysms were always of short duration. As soon as this patient was delivered of her first child, the little tumour became at once exempt from any uncommon irritability, and the periodical paroxysms of acute pain quite ceased; and in this state it remained during thirteen months, except that some little uneasiness was perceptible before the falling of much rain or snow. In the end of that period, the patient having again conceived, the

tumour acquired its former irritability, and she was affected precisely in the same manner as she had been during her first pregnancy. At this period an attempt was made, by a surgeon, to cure the disease, by making a crucial incision into the tumour, to promote suppuration, and to destroy its irritability; but as this failed, excision was had recourse to, which proved effectual. Immediately after her third conception, however, the little tumour was reproduced, but did not increase quite to its former size, and the paroxysms of pain commenced and returned two or three times daily, as during the former pregnancy. When the third child was born, the tumour became at once perfectly indolent, as it had formerly done. The patient having again conceived, the irritability of the little tumour commenced as usual, and the periodical pain became more violent than ever. At this time Dr Bisset was consulted, who directed the application of the caust. commune fort., which produced its effect in twenty minutes. After the separation of the eschar, some small remains of the tumour were destroyed by caustic. By this means an effectual cure was accomplished, as, during two successive pregnancies, there was not the least return of the disease.

In the first case detailed by Mr Pearson, the tumour was of seventeen years' standing; it occurred in a married female, of 51 years of age, when in the third month of her second pregnancy. "The skin," says Mr Pearson, "which covered the particular seat of her complaint, retained its natural colour;

but there was a circular induration, of about half an inch in diameter, very little elevated above the surface, which was exquisitely painful, when slightly touched or compressed. This morbid part was situate in the course of the vena saphena major, and was about six inches above the joint of the ankle. Besides the acute pain, which was produced by inadvertently touching this little tumour, Mrs P. commonly suffered several paroxysms of pain every day; each of these attacks was accompanied with an increased redness, and a sensible elevation of the indurated part, the pain at the same time extending to the knee, and often darting to the stomach; the duration of the fit was about twenty minutes; it was attended with slight convulsive motions of different parts of the body, and frequently terminated with flatulent eructations. These fits of pain did not recur at any regular periods; so that the number which she underwent in the course of a day was various and uncertain; for a disordered state of the stomach, or a sudden perturbation of mind, would at any time excite one of the paroxysms. She also had observed, that the severity of her sufferings was invariably increased during the periods of menstruation and pregnancy; and that, in the latter months of gestation, the duration of each recurrence of pain was extended to an hour and a half. But although this disease was uniformly aggravated by certain alterations in the state of the uterus, yet it continued with undiminished severity after Mrs P. had ceased to bear children; for, when her youngest child was

more than six years old, she had not experienced any abatement of her daily sufferings. About thirteen years ago, I advised her to have the morbid part removed; but, at that time, she was unwilling to undergo an operation." The tumour was at last destroyed by caustic. "She endured the most excruciating tortures during several minutes after its application; but the pain gradually diminished with the sensibility of the part; so that, in about twenty minutes, the eschar was completely formed, and she then felt no more pain than what is the usual consequence of a caustic applied to any part of the body. From this day, she never experienced the recurrence of a single paroxysm of pain; the eschar exfoliated in about twelve days;" and in about seven weeks the sore was perfectly healed.

In the second case mentioned by Pearson, the tubercle was situate at the posterior part of the leg of a female, near the beginning of the tendo Achillis: From this, he states, "The patient suffers acutely whenever it is touched. She has occasional paroxysms of pain, but they return at uncertain intervals, and she thinks that they grow milder. In this instance, as in that recorded by Dr Bisset, the tumour becomes uneasy in rainy and windy weather; but it does not appear that the disease had ever any connexion with pregnancy."

The only cases which, so far as I know, have been published in this country, since 1812, are three, contained in the Edinburgh Medical and Surgical Journal, and one in a dissertation on the treatment

of morbid local affections of nerves, published by Mr Joseph Swan, in 1820.

The first of these is very minutely and accurately detailed by Dr Marshall Hall *. The tubercle was small, of the texture of cartilage, situate near the point of the fore-finger of the left hand of a man, to whom it had been the cause of severe and painful suffering for the long period of twenty-two years, from which he was completely relieved by the removal of the diseased part.

The second case is an interesting one, of which a very distinct account is given by Mr John Windsor †. He found, on removing the tumour, which was of the size of a large pea, a filament of a nerve going to it, and penetrating into its substance. The tumour was in the fore-arm of a woman, and was of six or seven years standing: when laid open, it was found to contain "a number of granules quite gritty or earthy to the feel." A cure was effected by excision.

The third case is accurately described by Mr David Laing ‡. The tubercle was of the size of a horse bean, of two years' standing; it was encysted, and apparently of a cartilaginous nature; it occurred in the leg of a female, and was removed by the knife.

In the case published by Mr Swan ||, the tuber-

* Edinburgh Medical and Surgical Journal, vol. xi. p. 466.

† Ibid. vol. xvii. p. 261.

‡ Ibid. vol. xviii. p. 245.

|| Dissertation on the Treatment of Morbid Local Affections of Nerves, by Joseph Swan, 1820, p. 81.

cle, at the end of seven years, had attained the size of a large pea; it was seated about the middle of the leg of a married female, and appeared without any known cause. "The pain she suffered," says Mr Swan, "was very great, and was always brought on and aggravated by surprise, fear, or any affection of the mind, and likewise by cold. Keeping the whole body warm, always relieved the pain. After she had suffered very much, she consulted a surgeon, who divided the skin over it, and recommended the wound to be kept open, and caustic to be frequently applied to it. It was treated in this way for three months, but without any good effect. Some time after, I saw her, and cut out the tumour, with the surrounding portion of skin. When cut into, it had a cartilaginous appearance, and a cutaneous nerve was seen passing between it and the skin, and an expansion of the nerve was spread over it. After its removal, all the distressing symptoms left her, and never returned."

To these cases I am enabled to add four, which have not yet been published.

The first of them I had an opportunity of seeing, in the year 1813, under the care of my friend Mr John Walker, Fellow of the Royal College of Surgeons. The tubercle was of the size of a pea, situate in the leg of a young lady, over the tendon of the peroneus longus muscle; it was of four years standing, and had been gradually, but very slowly, increasing in size: she suffered excessively from violent attacks of pain in the tubercle, extending down-

wards to the foot. These paroxysms recurred spontaneously, and generally several times in the course of each day, but were more frequent at changes of the weather. The pain frequently continued for three quarters of an hour at a time, and it became gradually less severe before going off. The tubercle, by her account, appeared to increase in size during the paroxysms, and the skin over it, which was in general of its natural appearance, assumed a bluish colour. For eighteen months this disease had been the cause of very great suffering, as the paroxysms, which had always been severe, had both increased in frequency and duration, and the pain had become much more acute. She willingly submitted to the removal of the tumour by the knife, and was by this means entirely relieved from her suffering.

Of the second case, I have received a very distinct account from my friend Dr David Hay, which I shall state in his own words.

"In the month of April 1825, I removed a painful subcutaneous tubercle, from the inside of the leg of a lady about sixty years of age. The tubercle was seated over the lower edge of the gastrocnemius externus, just at the part where the soleus extends beyond it. It was most acutely painful during the night, particularly towards morning; the paroxysms of pain were by no means regular in their accession or their duration, frequently lasting several minutes, at other times being more transient, although so frequent in their recurrence as to banish sleep. The pain was compared to that of the toothache of the

most excruciating kind. During the fits of pain, the tubercle became more than usually turgid, and the integuments covering it redder than usual. Handling occasionally excited the pain, but not always, as the tubercle often bore examination like any other part of the skin. The lady first remarked the pain in her limb, about three years before, and was led by it to discover the existence of the tubercle. She had applied evaporating and anodyne lotions without relief, and gladly submitted to have it removed by excision, in order that she might be freed from the suffering it induced.

The tubercle was about the size of a pea, of an oblong rounded shape; its under surface was slightly lobulated. The wound healed by the first intention, and there has been no return of pain in the part from which the tubercle was removed." The tubercle has been deposited by Dr Hay, in the Museum of the Royal College of Surgeons *.

The third case is that of a lady, whom I had an opportunity of seeing under the care of my friend Dr Simson, who has favoured me with the following account of the symptoms and progress of the complaint.

"*March* 1827.—Mrs D. æt. 36. On the outer edge of the triceps extensor cubiti muscle of the

* A representation is given in Plate V. Fig. 1. of the size and form of this tubercle.

right arm, and about two inches above the elbow-joint, there is situate a small, hard, subcutaneous tubercle, about the size of a garden-pea, which is moveable, and at times can be examined without any uneasiness, whilst at other times the least touch brings on a paroxysm of pain. She states, that, about six years ago, when at rest, she felt a sensation as if she had been stung by an insect, and that, upon raising her hand to the part pained, a small swelling was discovered, not much less than at present, which, for the first four years after, gave her little uneasiness, the attacks of pain being few, slight, and not of long continuance. That for the last two years, and more particularly during the last winter, the paroxysms have been exceedingly severe, occurring very frequently, and continuing at times for several hours, during which time the pain extends for a considerable distance over the neighbouring parts. The tumour also, she thinks, has increased during that time a little in size. For the last three months she has had, almost every night, upon going to bed, an attack of pain, and also upon getting up in the morning. During some of these paroxysms the pain is so severe that she cannot allow the bed-clothes to touch the arm, and she has to sit up in bed for several hours. Cold, she thinks, brings on the attacks oftener than any other cause; and she has been in the habit of wearing flannel for some months upon the arm, to protect the tubercle from the influence of changes of weather. Smart blows also bring them on; and not unfrequently

they occur without any evident cause. When the paroxysm is severe, the tumour is a little elevated, and there is often a bluish appearance over the external point. The tumour was easily removed by a simple incision through the skin, and was found very slightly attached to the surrounding parts. It is about the size of a large garden-pea, pointed at the top, and somewhat lobulated. When cut into, it has the colour of the medullary part of the brain, appears to be fibrous, and is nearly of the consistence of soft cartilage. The wound healed by the first intention, and she never has had any more pain.

The tubercle is preserved in the museum of the Royal College of Surgeons.

The fourth case is that of a female servant, of about 50 years of age, at present under my care. The tubercle is of the size and shape of a French-bean, but rather flatter; it is placed upon the left foot, a little below, and anterior to, the outer ankle; it is very prominent, in consequence of its situation, and of the integuments lying over it being extremely thin. She has been subject for the last seventeen or eighteen years to frequent severe attacks of pain in the tumour, occasionally shooting to the toes; these attacks generally come on spontaneously, and are most frequent during the night. They occur occasionally several times in the course of one night; and they often destroy her sleep night after night. She is sometimes free from these attacks for weeks or months; they are most frequent at changes of the weather, and particularly during the winter.

The pain at the commencement of the paroxysm is slight, but gradually increases, till it becomes excessively acute and shooting, like that of very severe toothache; it lasts for an hour or more at a time, and before going off seems to be converted into a burning heat. She is aware that the paroxysm is drawing to a close, when the acute pain subsides, and the feeling of burning heat commences. During the paroxysm, the tubercle is excessively painful to the touch, and is sometimes of a bluish appearance; in its ordinary state, however, it may be handled freely in any direction, without uneasiness being excited. The tubercle was first observed about thirty years ago, immediately after a sprain; about fourteen years since it was the size of a pea, and had not before that time been the cause of any great distress. She declines for the present having the tumour removed, as she thinks she has not suffered so much for some months as she did formerly; and she has been impressed with the belief that she will become permanently lame, if any operation should be performed *.

The disease of which we are treating, seems to have met with much more attention from continental authors, than from those of this country; and my attention having been particularly directed to their writings, by the judicious remarks of the re-

* The size and form of this tubercle is represented in Plate V. Fig. 2.

viewer of Dr Abercrombie's very valuable work on the Diseases of the Brain and the Spinal Cord, contained in the last number of the Edinburgh Medical and Surgical Journal, I have looked into such of these works as were within my reach, and have had the satisfaction of finding that many cases of the disease have been published, and that some interesting and accurate accounts of its history have been written both previous to and since 1812. I shall proceed to give an abstract of these cases and histories, as several of them are contained in works not generally in the hands of medical practitioners in this country.

Of the older authors, Hippocrates, Galen, Avicenna, John de Viego, and Ambrose Paré, have all been referred to as describing swellings or tumours of the nerves *; which may possibly have been of the same nature with those which we are considering; but the accounts of them are so vague as to render it impossible for us to judge accurately either of their real nature, or of their effects. In the work of Morgagni, however, De Sedibus et Causis Morborum, there is a case related by Valsalva, which may, I think, be regarded as one of those at present under consideration. "Virgini, aiebat Valsalva, fuisse exiguam ad malleolum extuberantiam, quæ ab annis plus sexdecim, tantos sæpe crearet dolores, ut non

* Alexander, Dissertatio Medico-Chirurgica de Tumoribus Nervorum, Lugduni Batavorum, 1810, p. 14. Descot, Dissertation sur les Affections Locales des Nerfs, à Paris, 1825, p. 208.

semel nisi domestici prohibuissent, eum sibi pedem fuisset abscissura. Sectis ibi secundum cruris longitudinem communibus integumentis, glandulam a se deprehensam esse parvam, forma ovali, sed depressa, colore et natura uti videbatur inter conglobatas et conglomeratas media. Hac adempta glandula, nullum amplius dolorem rediisse *."

Marc Antoine Petit, in a Discourse " Sur la Douleur," delivered at Lyons in 1798, which is published along with his " Essai sur la Medecine du Cœur †," says, " Je n'ai pu soulager que par l'extirpation, les atroces douleurs qu'occasionnent certains ganglions nerveux que l'on voit se développer sous la peau;" and he adds in a note, " Cette espèce de maladie est assez peu connue; ce sont de petites tumeurs, du volume d'une fève, très dures, mobiles, sans couleur, survenues dans des endroits frappés, et le plus souvent sans cause apparente, qui occasionnent des douleurs cruelles au plus léger toucher, dans les mouvemens un peu violens, ou dans les changemens de temps. Aucun topique ne les soulage; rien ne peut les dissoudre; l'extirpation guérit seule. On trouve une tumeur blanche, enveloppée d'une membrane fibreuse dans son interieur, ordinairement adhérente à la peau, assez libre dans le tissu cellulaire, ou elle ne paraît tenir qu'aux filets nerveux dont elle est l'epanouissement. Le plus

* Morgagni, De Sedibus et Causis Morborum, vol. iii. p. 28.

† Essai sur la Medecine du Cœur, &c. 1823, p. 256.

grand nombre de celles que j'ai opérées etait aux jambes; une seule occupait l'avant-bras." This is a short but accurate description of the disease, and the author seems to have adopted the same opinion with Camper, that it depends upon an affection of the small branches of the subcutaneous nerves. He refers to the case detailed by Valsalva as being of the same nature.

Odier of Geneva, in his "Manuel de Medecine Pratique," which contains a summary of a course of lectures delivered in 1800, 1801 and 1804, in treating of tumours says, "J'appelle *Chondrome* une petite tumeur mobile, et de substance cartilagineuse, que j'ai vue quelquefois, soit en consequence de quelque contusion, soit sans aucune cause connue, se manifester dans les parties molles, et que sa forme anguleuse et irreguliere rend souvent tres douloureuse. Elle ne se guerit que par l'excission." I am disposed to think that the disease to which Odier refers is the same with the one I have described, as the tubercles in it have been generally found to exhibit the appearance of cartilage; and I am not aware of any other author having mentioned the existence, in the soft parts, of small pieces of real cartilaginous matter, producing pain only by their form. After having described the species of tumour which he terms *Chondrome*, he proceeds: "Enfin, on peut donner le nom de *Neuromes* à ces tumeurs mobiles, circonscrites et profondes, qui sont produites par le gonflement accidentel d'un nerf, à l'extremité duquel la compression de la tumeur fait eprouver des crampes

tres-penibles. C'est heureusement une maladie rare." Under this species, as described by Odier, and denominated *Neuromes*, I conceive ought to be comprehended those large tumours which are found to be distinctly connected with the nervous trunks, and of which he proceeds to detail a case which occurred in his own family; the tumour was connected with the radial nerve, and, on account of its great increase in size, it was found necessary to remove the arm *.

Cases of this kind have been described by various writers; Odier refers only to those mentioned by Gooch and Cheselden.

Portal, in his work entitled, " Cours d'Anatomie Médicale," published in Paris in 1804 †, when treating of the nerves of the arm, says, " Il se forme quelquefois des durillons dans les nerfs cutanés, et dans les autres nerfs, qui ne deviennent pas plus gros qu'un pois. ' *Pisi magnitudinem non excedunt*,' dit *Camper*. Ces durillons peuvent donner lieu aux douleurs les plus vives. *Camper* a cru devoir les extirper, et il l'a fait avec succès. Ces ganglions contiennent interieurement une substance blanchâtre, et sont renfermés entre les fibrilles des nerfs." This account seems to be taken from that of Camper; he adds, however, a detailed history of a very interesting case, which was met with by Le-

* Odier, Manuel de Medecine Pratique, p. 362.

† Portal, Cours d'Anatomie Medicale, 1804, vol. iv. p. 246.

duc, one of his former pupils, which will be particularly noticed afterwards in this communication.

In the first volume of a work published by J. B. Von Siebold in 1805 *, the following case is recorded by Neumann. A man of seventy years of age had, for above thirty years, in the middle and inferior part of the fore-arm, a swelling of the size of a pea, very painful to the touch, and upon the slightest pressure. It had arisen from a severe blow on the arm; the skin covering it was moveable and healthy, but it was immoveable itself, in consequence of adhering to the muscles. During the preceding year, the tumour had increased to the size of a middle sized bean, and its sensibility had been very much increased, so much so that the man experienced intolerable pain, stretching along the hand and arm upon the slightest motion; and, on stronger pressure, after a short but violent pain, he lost, for a time, all feeling and power of the arm. There then arose a sensation of numbness or sleeping in the whole arm and hand; and the return of feeling and muscular power was attended with a painful tingling. In consequence of these symptoms, the patient consulted Neumann, who advised that the tumour should be extirpated. The skin being divided, several arteries required to be secured; the tumour appeared white and unequal; it was, upon examination, found to be formed by a knotty thick-

* Sammlung seltner und auserlesener chirurgischer Beobachtungen und Erfahrungen. Band 1st. S. 54.

ening of the cutaneous nerve, at the place where it passes from the muscle to the skin. The patient was distressed with so great pain that Neumann durst not cut the nerve, and the more so that an artery was so near that it would have been divided along with it. He thought that it would be imprudent to apply a ligature, for fear of convulsions; he resolved, therefore, first to diminish the sensibility by narcotics, and then to destroy the tumour by bringing on suppuration. By the application, for three days, of opium and oil of turpentine, the sensibility was so much diminished that he was enabled to apply caustic, by which the tumour was gradually and completely destroyed. When the cicatrization, however, was going on, and the patient felt so well that there was a hope of perfect health being restored, he died suddenly from apoplexy, brought on by a fall upon the ice.

To this case, Siebold has added an account of the cases of tumours of the nerves, which he considers similar, recorded by Cheselden, Camper, Bisset, Home, Dubois, Hesselbach, &c. and the following one, which fell under his own observation. "I myself," he says "(the publisher of this collection), had an opportunity of observing it in a singular old woman, who, in consequence of the number of children she had borne, had acquired on both legs and feet a considerable plexus of varicose vessels, and had frequently experienced erysipelatous inflammation in these weakened parts. On one of these varicose feet, in front, between two small bones, there were

two such small nervous swellings, which lay almost close to one another. The patient suffered the most intense pain; soothing and exciting remedies, in particular opiates, were of little avail internally or externally. When these bean-like swellings were touched, the woman experienced intolerable pain. My father resolved to destroy them by the caustic of Bernard, in which he succeeded. But some years afterwards they recurred with the same violent symptoms. A surgeon applied the same corrosive, but without success, not knowing how to use it. I was called, and, influenced by the juvantia and lædentia, I resolved likewise to destroy these swellings, but left it to the patient to determine whether she would be relieved by the hot-iron, or by the same corrosive as before. She preferred the latter. In order that the caustic might operate properly, and destroy the nervous tubercles, I made a deep incision into both tubercles with a bistoury, upon which the patient uttered a piteous cry, so that the whole relations ran in from the adjoining room. As soon as the small bleeding from the little wounds had ceased, I applied the caustic, and with so much success, that, up to the present time, the patient has not complained of any fresh attack. From the great age of the patient, and other symptoms, I am disposed to consider them as connected with gout."

Dr Alexander, in an Inaugural Medico-Chirurgical Dissertation, published in Holland in the year 1810, "De Tumoribus Nervorum," after referring

to the writings of the older authors, quotes Camper's account of the small tumours described by him, and gives a detailed statement of the cases published by Neumann and J. B. Von Siebold; of the latter, however, his account is very incorrect. These he considers as of the same nature with the disease which has been termed Neuroma by Odier; and to the numerous cases of this kind which he quotes from the writings of Cheselden, Sir Everard Home, Dubois, Petit, Louis, Hesselbach, &c. he adds two original cases which he had seen under Reich. But whether the opinion generally entertained in regard to the nervous origin of the small tubercles, which I have denominated Painful Subcutaneous, shall be ascertained to be correct or not, it appears to me desirable that they should be treated of separately, and considered as forming a distinct variety, if not species of tumour, from those of larger and more rapid growth connected with the nervous trunks, because they differ from them in situation, symptoms and progress, as well as in size; and in the one case the diseased part may be taken away by the knife with perfect ease, safety and effect; while, in the other, the removal of the limb is occasionally found necessary; and even when the tumour can be dissected out, the operation is not always free from danger to life, as has been proved by experience.

Monteggia, in treating of tumours*, refers to

* Monteggia. Istituzioni Chirurgiche, 1813, vol. ii. p. 195.

those described under the term *Chondroma* by Odier. He says, they are "solid, organized, fleshy tumours, which acquire occasionally a great degree of hardness, nearly approaching to that of cartilage." This description of the texture of the tubercles tends to confirm the opinion stated above, that they are of the same nature with those described by Camper, &c. as tumours of the nerves. He then proceeds, "Other tumours of a fleshy nature, or still harder, form at times in the cellular substance, or in the proper tissue of the nerves, or so near to them as to implicate and hurt them by their adhesion, or pressure, and have been called by Odier *Neuroma* or Nervous Tumours. They are moveable, circumscribed, deep; caused, according to him, by the swelling of some nerve." Monteggia refers to the case which occurred in the family of Odier, in which it was found necessary to amputate the arm. He then quotes from M. A. Petit, the account of the small tumours described by him, which he considers of the same nature with these arranged under the term *Neuroma* by Odier. To me, however, they appear to have a much stronger resemblance to those classed by him under the name of *Chondroma;* and to be decidedly of the same nature with those mentioned by Camper, &c. "Some regard these tumours," he says, "as true scirrhus or cancer of the nerves. Jacopi appears to suppose with some other authors, that the neuroma is formed by a condensed humour between the nerve and its sheath; and gives a case of a slight hardness in the calf of

the leg, which compressed the nerve from without, and produced the same symptoms as neuroma, which ceased on its extirpation *."

" Different observations of neuroma," adds Monteggia, " may be quoted, as having been made by Valsalva, Camper, Gooch, Cheselden, Bisset, &c. which prove that this disease is not rare, and that it should be treated of, therefore, in the institutions of surgery. I have seen them both in the fore-arm and leg accompanied by pain for many years, with some atrophy; and I have also extracted a small one from the side of a finger or toe. And, finally, in a dead body I found all the nervous system occupied by hundreds of neuromata,—a circumstance which would seem to shew, that there at times occurs a neuromatose diathesis, as we sometimes see the steatomatous, lipomatous, &c. by the endless multiplication and diffusion of similar tumours through the whole body. The application of ice has been sometimes useful in alleviating a little the great pain of neuromata; on other occasions baths and mineral clays have been of advantage. I have seen benefit result from the application of a cautery to the pained part. But the only cure for all these is the extirpation of the neuroma as long as it is accessible to diagnosis and cure, or of the whole part from which it originates, if the severity of the symptoms warranted so harsh a determination."

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* Jacopi, Prospetto della Scuola di Chirurgia pratica, vol. i. cap. 9. Milano 1813.

The latest, and by far the most full and accurate, history of the disease is that given by Dr Descot, in his dissertation upon the local affections of nerves, a work published in Paris in the year 1825, which, he says, was written under the direction of the celebrated Beclard. He treats of it in his chapter upon neuroma or tumours of the nerves. These he comprehends under two heads; he says, "Le volume et le siege de ces tumeurs peuvent les faire distinguer en deux sortes." The one he terms, "Tubercule sous cutané douloureux," the other, "Tumeur voluminеuse ou multiple des Nerfs." After describing the subcutaneous tubercles, he says: "Ces petites tumeurs sont ordinairement enveloppées dans le tissu cellulaire, et n'y paraissent adherentes que par les filamens nerveux. D'autres fois elles sont situées dans l'epaissure meme de nerf, dont les filets sont ecartés et les entourent." He proceeds to give a very full and interesting account of the symptoms and progress of the disease; he points out the necessity of an operation for its cure, and the preference that is due to the use of the knife for the removal of the diseased part, over that of caustic, or of the actual cautery, as being a much less painful and less tedious operation, and much more certain in its effect. He refers to ten of the cases published in the Edinburgh Medical and Surgical Journal *; to many of those

* In mentioning these cases, he states that the fourth in my original communication is imperfect, as it does not contain the

recorded by the authors whom I have already mentioned; and he adds several new and interesting ones.

The first of these is detailed by M. Nicod, in these terms: "Il y a deux ans que j'extirpai sur la poitrine d'une femme de quarante ans une tumeur lenticulaire de six à sept lignes de diamétre, mobile dans le tissu cellulaire sous-cutané, paraissant recouverte par la peau, amincie au point de lui donner une légère teinte brunâtre, qui, jointe à la violence des douleurs, qui privaient totalement la malade du sommeil depuis plusieurs mois, avait fait croire à plusieurs medecins que la tumeur était cancéreuse. Ce n'etait qu'une tumeur enkystée, dont l'extirpation fut suivie d'un profond sommeil pendant toute la journée, la nuit suivante, et le lendemain presque entier *."

The two following cases were given to Descot by M. Marjolin: "1*st*, M. J. marchand epicier, agé de trente ans, d'une constitution robuste, éprouvait depuis plus d'un an des douleurs vives, lancinantes, intermittentes, dans le coté droit du scrotum, et à la partie interne de la cuisse du meme coté. Le scrotum n'etait pas tuméfié; mais il devenait plus rouge lorsque les douleurs etaient tres-vives et prolongées.

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result. At the time when I wrote, the lady had not consented to an operation; but topical remedies having produced little or no alleviation of her suffering, she soon afterwards agreed to the removal of the tubercle by the knife, and a perfect and permanent cure was effected.

* Nouveau Journal de Medecine, Novembre 1818.

Les bains emolliens, les cataplasmes et les linimens emolliens, et narcotiques, n'avaient produit aucun soulagement. Appellé pres de ce malade, je reconnus qu'il existait dans le tissu cellulaire du scrotum, immediatement au-dessous de la peau, plusieurs petits corps lenticulaires, lisses, mobiles, durs et isolés les uns des autres. En comprimant ces corps entre les doigts, on donnait lieu à des douleurs analogues à celles que le malade ressentait habituellement. Il se decida facilement à se laisser extirper ces corps. Une petite incision fut faite sur chacun d'eux: et en comprimant les bords des incisions, on les fit sortir tres-aisément; chacun d'eux pesait quelques grains; leur surface etait lisse, blanche, sans consistance ferme; en les incisant, ils parurent etre fibro-cartilagineux dans toute leur epaisseur; ils ont paru plus denses vers leur peripherie qu'à leur centre. Depuis l'operation, le malade a entierement cessé de souffrir."

" 2*d*, Une Dame de Rouen, agée de soixante ans, porte à la partie interne et posterieure de genou une tumeur qui parait etre de la meme nature; parait dure, lisse, mobile. La dame qui porte cette tumeur, eprouve de temps en temps de vives douleurs, qui partent de ce point, et se propagent avec rapidité, le long de la partie interne de la jambe et du pied. On est parvenu à calmer les douleurs par des applications narcotiques. Cette dame refuse de se soumettre à aucune operation."

In none of the cases which have been hitherto mentioned, has the tubercle disappeared without the

use of the knife, or without its being destroyed by the actual cautery, or by the application of caustic. There is one case, however, recorded by Descot *, supposed to be of this nature, in which the diseased part gradually disappeared, and the symptoms went off. The disease occurred in the person of the celebrated Beclard himself, who gives the following account of his own complaint: " Un etudiant en medecine, elève interne à l'Hotel-Dieu d'Angers, habitant un appartement situé à plusieurs pieds au-dessous du sol de la cour, et couchant dans un alcove creusée dans l'epaisseur du mur de l'Hôpital, eut, au bout de quelques mois de sejour dans ce lieu insalubre, un accés d'arthritis au gros orteil, et peu de temps aprés il se developpa sous la peau qui recouvre la veine et le nerf saphéne internes à la jambe, une tumeur dure, grosse comme un grain de blé, et qui, toutes les fois qu'elle etait touchée par le malade, soit en mettant ou en otant ses vêtemens, soit dans toute autre circonstance, occasionnait une douleur qui s'etendait comme un choc électrique sur le pied dans la direction des ramifications du nerf. Ayant obtenu des administrateurs de l'hôpital un autre appartement, il fut, au bout de quelques mois, gueri de la neuralgie et du tubercule sous-cutané. La même personne, quelques années apres, etant à Paris, eut sous le menton un petit furoncle dont la cicatrice resta pendant pleusieurs mois le point de depart d'une douleur vive, excitée par le frottement

* Page 211.

du rasoir, et qui s'etendait en rayonnant au-devant du cou et de la poitrine."

The symptoms of this affection bear a strong resemblance to those of the disease which we have been describing, but I am disposed to doubt its having been of the same nature, as, from the texture of the tubercles which I have had an opportunity of examining, and from the description of others given by different writers, I can hardly suppose it possible that a tubercle of this kind, when once formed, could be removed by absorption; and it is the only case where such a termination has been suspected. From the second affection, too, in Beclard's case, where similar symptoms to those which had occurred in the first took place, without the formation of any tubercle, it may be supposed that both depended upon a different cause.

My friend Dr Craigie has favoured me with a perusal of a proof sheet of a general work upon anatomy preparing by him for publication, in which there is a neat short account of tumours of nerves, given by him when treating of the nervous tissue. He has adopted the opinion of Camper, that the small subcutaneous tubercles depend upon a diseased state of the subcutaneous nervous twigs; he thinks, however, that they should be considered distinctly from tumours originally formed in the larger trunks of nerves; and from tumours of various kinds, and of considerable size, which in their progress come to affect, or rather to involve, these trunks; to all these he retains the name of Neuroma, adopted by Odier.

To the lenticular or pisiform tubercle, which I have denominated painful subcutaneous, he proposes to apply the term Neuromation (Νευρωμάτιον), with the view of marking their nervous origin. By him I have been favoured with references to several of the works I have already quoted.

The symptoms and progress of the disease, as detailed in these cases and histories, exhibit a remarkable similarity; and it is satisfactory to me to find, that by them is confirmed the accuracy of the general history of the complaint, which I drew up in 1812, when my means of information were much more limited than at present. It is to be observed, however, that the connexion betwixt the sensibility of the tubercle and changes of the weather, is more generally, and more strongly, marked in these cases, than in those originally published in the Medical and Surgical Journal. And in the cases reported by Dr Bisset and Mr John Pearson, the irritability of the tumour seems also to have been materially affected by the state of the female constitution, during the periods of pregnancy and menstruation; a fact which has not been generally remarked by writers upon the subject.

I shall now proceed to bring under the notice of the Society, a detailed account of three cases, in which symptoms of a much more severe and distressing kind, but luckily much more rare, were found to arise from, or, at least, to be connected with, small tumours, most probably of a similar na-

ture. The first is recorded by Dr Thomas Short, in the Medical Essays and Observations, published in 1728 *. "In July 1720," he says, "a woman, about thirty-eight years of age, was brought to me; she had laboured twelve years under an *Epilepsy*, which, from one fit a month, was come to four or five violent ones every day, each continuing an hour, or an hour and a half; by which she was rendered moppish and silly, and incapable to take care of her house and family. Her husband was reduced in his circumstances, from his affection and care for her, having got, and followed, all the advice he could. Evacuations of all kinds had been tried; the epileptick and cephalick tribe of medicines had been ransacked, and many other medicines had been used in vain, the disease growing more severe. Her fit always began in her leg, towards the lower end of the *gastrocnemii* muscles, and, in a moment, reached her head, threw her down, foaming at the mouth, with terrible distortions of the mouth, neck and joints. Whilst I talked with her, she fell down in a fit. I examined the leg, and found no swelling, hardness, laxness, or redness, different in that place from what was in the other leg; but suspecting, from her fit beginning always at that part, that the cause of her disease lay there, I immediately plunged a scalpel about two inches into it, where I found a small indurated body, which I se-

* Medical Essays and Observations, published by a Society in Edinburgh, vol. iv. p. 416.

parated from the muscles, and then took it up with a forceps; it proved a hard cartilaginous substance or *ganglion*, about the size of a very large pea, seated on a nerve, which I cut asunder, and took out the tumour. She instantly came out of the fit, cried out she was well, and never after had a fit, but recovered her former vigour, both of body and mind."

The second case is reported by Benedict Mojon and Marzell Covercelli, in the "Memorie de la Societa Medica di Emulazione de Genova *;" this I have not been able to see, but it is translated into German in Siebold's Chiron †, from which the following account is extracted. The case occurred in 1798. The woman experienced a sharp pain in the back part of the left leg, and afterwards a kind of cramp, which extended over the whole limb, and ceased after a few minutes. Some months afterwards she experienced a similar pain, accompanied by convulsions of the whole left side, which lasted about a quarter of an hour. For twenty months she had different convulsive attacks, always preceded by torpor of the left leg. She was particularly attacked by them, if she attempted to lift any thing heavy, or sat down quickly. The attacks became of longer duration, and more frequent, were no longer confined to the left side, but stretched over

* Tom. I. Primo quadrimestre, p. 89—93.

† Band. I. st. 645.

the whole body. They left behind them a want of power, and an extraordinary somnolence, which lasted several hours. She became gradually weaker, and more emaciated, and died 21st April 1800, after a very severe attack of convulsions, which lasted from mid-day to the following morning. The examination of the body was accidentally made in the dissecting-room; on cutting through the muscles of the left leg, about the lower third of the semi-membranosus muscle, there was found an irregularly formed stone, of the size of a hazel nut, with a rough surface, which lay upon a ramification of the sciatic nerve. This stony concretion was surrounded by a cyst of cellular substance, and lay below the common integuments, beneath which it could be felt, on pressure with the finger. They had no doubt that the torpor of the left leg, which preceded each convulsive attack, her other sufferings, and even her death, were the consequences of this substance; no other morbid appearance was observable in the body. These writers refer to the case recorded by Dr Short, and to a case mentioned by Cappel, where epilepsy, terminating in death, arose from a similar concretion attached to the par vagum; and to a case detailed by De Haen, who considered the epilepsy to have depended upon small ganglion-like concretions attached to the phrenic nerves.

The third case occurred to Le Duc, a pupil of Portal's, who gives the following history of it: "Le citoyen *Le Duc*, un de mes anciens disciples, a gueri une femme qui eprouvoit de frequens accés

d'epilepsie, qui commencoient par de vives douleurs du pouce de la main droite, par l'extirpation d'un durillon pres de l'articulation de la premiere avec la seconde phalange du coté de la paume de la main. La plus legere compression de ce durillon donnoit lieu à de vives douleurs, et quelquefois à des accés d'epilepsie : la dure-mere n'etoit point apparente. J'avois vu cette malade, et je lui avois prescrit beaucoup de remedes inutilement. Les douleurs qui precedoient alors les accés epileptiques etoient beaucoup moins vives qu'elles ne le furent dans la suite *.

In these three cases, the epileptic fits seem to have been distinctly connected with the small nervous tumours; in two of them, indeed, the proof of the connexion is quite satisfactory, as the epilepsy ceased as soon as they were removed.

In referring to them in his review, in the Edinburgh Medical and Surgical Journal, of Dr Abercrombie's invaluable work on the Diseases of the Brain and Spinal Cord, in which is given an interesting outline of the Diseases of Nerves, my learned and judicious friend, Dr Craigie, points out the propriety of an accurate examination being made of the part from whence the epileptic aura arises, in cases of epilepsy in which this symptom occurs, with the view of ascertaining whether any similar tumour exists. " It is not improbable," he

* Cours d'Anatomie Medicale par Antoine Portal, 1804, tom. vi. 247.

says, "that as, in these cases, the peculiar sensation called the *epileptic aura* was felt, the presence of these morbid growths was the material cause of the sensation. Though this is submitted as mere conjecture, we think it is not unseasonable to direct the attention of the practitioner to the fact, as it may enable him to cure a certain class of epileptic cases with more certainty than he could otherwise do*."

I have now detailed, at great length, the whole cases and histories of the disease with which I am acquainted.

The cases which I consider as distinctly belonging to this species, or variety of tumour, and which have been referred to in this communication, amount to thirty-five; in twenty-eight of these the patients were female,—in five male,—and in two the sex is not mentioned. In twenty-two the tubercle was seated in the lower, and in eleven in the upper, extremities; in one on the chest; and in one in the scrotum. In three cases only was there more than one tubercle present at the same time. The disease does not seem to be connected with any particular period of life; it has been observed at all ages, from thirteen to above seventy. The size of the tumour has been found to vary from that of a grain of corn, to that of a bean.

The disease is easily distinguished by the size,

* Edinburgh Medical and Surgical Journal, vol. xxix. p. 357.

form, and situation of the tubercle, and by the symptoms; and, fortunately, it admits of being simply, safely, and effectually cured by the removal of the diseased part by the knife, which is much to be preferred to the more painful, more tedious, and less effectual method of cure, by the use of the actual cautery, or of caustic applications.

The tubercle is easily removed by a single incision, and it is unnecessary to take away any portion of the integuments, or of the surrounding cellular substance. No bad effect has ever been found to follow this operation; and in one case only of twenty-five, in which excision was had recourse to, was there any return either of the tumour or of the pain: and in this solitary instance, it is to be remarked, an attempt had been made, previously to the excision of the tumour, to cure the disease, by making a crucial incision into the affected part, in order to promote suppuration, and thus to destroy its irritability: as this failed, excision was had recourse to, by which the complaint was removed for a time; but soon afterwards the tumour was reproduced. It is by no means unlikely, however, that the return of the disease was owing to some part of the morbid part having been allowed to remain, when extirpation was adopted, in consequence of the previous crucial incision and suppuration. Caustic applications, on the contrary, have been found to produce very severe pain, the treatment is tedious, even when they prove successful; and in several cases they have failed in curing the disease.

In regard to the nature of the tumour,—the opinion originally formed by Camper, that it depends upon a diseased enlargement of a portion of a subcutaneous nerve, has been almost universally adopted; and, from the nature of the symptoms, from their strong resemblance to those of Neuralgia, and to those arising from injuries done to the small subcutaneous nerves, as well as from the observations of several of the writers who have particularly examined the diseased part, there seems little reason to doubt the accuracy of the opinion. It is, however, very desirable that minute and accurate examinations of the tubercles, and surrounding parts, should be made, when opportunities occur of doing so; with the view of ascertaining, if possible, whether the diseased alteration of structure takes place in the neurilema, or within it; or whether it may have originated in the contiguous textures, and become afterwards connected with the nerve.

I am inclined to suspect that the very minute account of the structure of the tubercles given by some writers, has been drawn rather from a supposed analogy between them and the larger tumours connected with the nervous trunks, (in which the parts are much more distinct,) than from accurate observation: at least, in such examinations as I have been able to make, during the removal of the tubercle, or more carefully afterwards, I have found only a firm, whitish, homogeneous body, of a fibro-cartilaginous appearance; and I can hardly suppose it possible to discover, in a tumour of the size of a

pea, or of a bean, connected with a twig of a nerve so small as generally to escape observation (if, indeed, it be so connected), that the diseased part had existed "in the substance of the nerve itself, of which the fibrils had been separated from each other, and had surrounded the tumour." This description, however, I believe to be quite applicable to many of larger tumours of the nervous trunks.

In finishing these remarks, I ought, perhaps, to apologize to the Society, for having occupied so large a portion of time, upon a subject which may be considered by many to be unworthy of so much attention. It appears to me, however, that every observation is of importance, which tends to throw any light upon a class of diseases still very imperfectly understood,—those arising from, or connected with, morbid local affections of nerves.

Since the above communication was printed, I have received from my friend Dr Henry Davidson, whose accurate and extensive information upon every subject connected with the medical profession is well known, a reference to the following extremely interesting and well detailed case of painful subcutaneous tubercle, reported by Rayer *.

* Traité Theorique et Pratique des Maladies de la Peau, par P. Rayer, à Paris, 1826, tom. 1. p. 651.

" *Tubercule sous-cutané douloureux, développé à la partie postérieure de la cuisse droite.*— Marie Joséphine Roy, femme Fuque, âgée de quarante-deux ans, demeurant à Mortain, département de Seine-et-Marne, fut admise à l'hôpital Cochin, le 1re Octobre 1826.

" Cette femme, d'un tempérament sanguin et d'une bonne constitution, irrégulièrement réglée depuis plusieurs années, était atteinte, depuis environ huit ans, de la maladie que M. Wood a désignée sous le nom de *tubercule sous-cutané douloureux*. Je distinguai en effet à la partie postérieure de la cuisse droite, vers la réunion de son tiers supérieure avec les deux tiers inférieurs, un tubercule sous-cutané du volume d'un grain de raisin ou d'un fort pois à cautère ; la peau qui le recouvrait avait conservé sa teinte naturelle, et n'adhérait pas avec le corps de cette petite tumeur. Lorsqu'on embrassait celle-ci avec les doigts, elle paraissait arrondie ou ovalaire, et elle était non-seulement très-douloureuse au toucher, mais elle devenait spontanément, dans la journée, le siége de douleurs très-vives qui se propageaient dans toute la cuisse et la jambe. Cette femme m'a raconté qu'elle éprouvait, depuis quelque temps, des picotemens trè-vifs dans le point de la cuisse que j'ai indiqué, lorsqu'elle y distingua, en y portant la main, un petit tubercule du volume de la tête d'une grosse épingle. Il resta stationaire pendant environ trois ou quatre ans, déterminant des accidens analogues à ceux qu'il produit au-

jourd'hui, mais moins intenses. Il a aquis successivement les dimensions que j'ai indiquées. Pendant tout ce laps de temps il n'a pas cessé de produire, chaque jour, des douleurs et des accidens que son peu de volume rendait difficiles à expliquer. Ces douleurs se déclaraient indifféremment le jour ou la nuit, par des paroxysmes dont le nombre, la durée et l'intensité sont devenus de plus en plus considérables. Cette femme en a éprouvé successivement depuis deux jusqu'à quinze par jour ; leur durée a varié d'un quart d'heure à une heure. Dans ces derniers temps, ils produisaient des angoisses inexprimables, et arrachaient quelquefois des larmes à cette malade, qui parait avoir beaucoup de bon sens et de courage. Ces paroxysmes douloureux, qui se déclaraient souvent sans causes appréciables, étaient inévitablement produits par le plus léger attouchement du tubercule, et se développaient la nuit toutes les fois que cette malade se couchait du côté droit. Aussi, lorsque le femme Fuque se plaçait dans cette attitude, avait-elle soin d'interposer sa main, ou un autre corps entre le matelas et la partie supérieure de la cuisse. Elle prenait aussi toute sorte de précaution lorsqu'elle s'asseyait. Elle ne dissimule pas non plus qu'elle avait quelque répugnance, dans ces derniers temps, à faire examiner cette tumeur par les hommes de l'art. Pour en reconnaître le siége et les dimensions, ils exerçaient ordinairement différentes pressions à sa sur-

face, qui ne manquaient pas de produire un violent accès de douleur.

" Chaque paroxysme était annoncé par des picotemens, par des élancemens très-aigus, et par un sentiment d'une très-forte chaleur dans le tubercule et la peau qui le recouvrait. Un instant après, la douleur se propageait dans toute la partie postérieure du membre, depuis le tubercule jusqu'au talon, et se terminait entre la malléole interne et le bord interne et inférieur du calcanéum, sans diminuer d'intensité, dans tout son trajet. Le tubercule, le jarret et la partie interne du talon étaient constamment des points les plus douloureux. La plante du pied à été constamment exempte de douleur. Jamais celle-ci ne s'est fait sentir dans les régions fessière et sciatique, ou sur tout autre point placé au-dessus du tubercule. En se propageant, cette douleur ne se montrait pas sous forme de trainée, et suivant la direction d'un nerf particulier; elle était générale à la partie postérieure du membre. Les muscles et les nerfs de la partie antérieure de la cuisse étaient tout-à-fait exempts de douleurs. Lorsque cette femme avait marché pendant plusieurs heures, ou lorsqu'elle s'était livrée à quelque exercice actif, lés paroxysmes qui avaient lieu dans le jour étaient constamment plus vifs. Ces paroxysmes étaient également plus douloureux à l'approche des menstrues, et toutes les fois qu'il s'opérait un changement marqué dans la température de l'atmosphère, surtout lorsqu'elle devenait froide et hu-

mide. Pendant le paroxysme, la douleur se faisait presque toujours sentir par élancemens, par ondées rapides, qui du tubercule s'étendaient au talon, et qui, d'après la description que la malade m'en a faite, pourraient être comparées aux sensations douloureuses produites par des décharges électriques. Lorsque ces paroxysmes étaient longs et intenses, non-seulement la femme Fuque éprouvait le sentiment d'une forte chaleur dans le tubercule, mais encore dans toute la partie postérieure de la cuisse. Aussi, lorsque ces aceés la surprenaient pendant la nuit, cherchait-elle avec empressement les endroits non échauffés du lit. Après chaque paroxysme, qui n'était point accompagné de fièvre, cette femme était abattue ; comme après un travail forcé. Plusieurs personnes qu'elle avait consultées avaient considéré cette maladie comme rhumatismale, ou l'avaient désignée sous le nom de *crampe nerveuse*. Cette malade avait tenté différens remèdes, et appliqué à diverses reprises des sangsues autour du tubercule, sans éprouver de soulagement.

" M. Guerbois, chirurgien de l'hôpital Cochin, pratiqua le lendemain, 2 Octobre, l'extirpation de cette petite tumeur, et j'assistai à l'opération. Le tubercule fut mis à nu à l'aide d'une incision longitudinale, qui n'intéressa que la peau et le tissu cellulaire sous-cutané. Les bords de l'incision furent écartés et détachés du tissu cellulaire dans l'espace de deux á trois lignes. Le tubercule, saisi avec une érigne, fut enlevé avec une petite portion du tissu lamineux

qui l'enveloppait. La plaie ne fournit que quelques gouttes de sang, et ses bords, rapprochés à l'aide de bandelettes de diachylon gommé, furent réunis par première intention.

" A dater de l'opération, les paroxysmes ne se sont plus renouvelés, et le 6 Octobre la malade était complètement guérie d'une maladie qui, depuis huit ans, lui causait les douleurs les plus vives.

" Je montrai, le jour même, ce tubercule à M. Ollivier (d'Angers), et nous étudiâmes ensemble la structure de cette petite tumeur. Elle était ovöide, poids de six grains, lisse et d'un blanc très-légèrement bleuâtre. Cette teinte particulière, assez analogue à celle de l'empois, bien distincte sur-tout lorsqu'on examinait cette petite tumeur à la loupe, différait sensiblement du blanc nacré des cartilages. Le tissu de ce tubercule était solide et dur comme celui des fibro-cartilages, dont il différait en ce qu'on ne distinguait point de fibres dans son épaisseur. Il était homogène, sans vaisseaux et sans nerfs apparens, même à la loupe ; incisé dans plusieurs directions, il offrait partout la même consistance et ne présentait point d'aréoles. Extérieurement, il était enveloppé de tissu cellulaire, dans lequel nous ne pûmes distinguer aucun filet nerveux, même à l'aide d'une forte loupe. En résumé, l'aspect légèrement bleuâtre de ce tissu et les douleurs vives dont il avait été le siége dès les premiers temps de sa formation, nous firent penser qu'il était plutôt squir-

rheux que cartilagineux. Cette tumeur ne s'était point développée aux dépens d'un nerf; et en supposant même qu'elle fût située sur le trajet d'une des branches sous-cutanées postérieures du nerf sciatique, et qu'elle la comprimât, cette circonstance n'expliquerait ni l'intermittence des douleurs dont la tumeur était le siège, ni leur caractère aigu et lancinant."

This is a very interesting case, in consequence of there having occurred, in one individual, almost all the symptoms which have been met with, in various combinations, in the other patients. It is important, also, on account of the minuteness and accuracy of the examination of the tubercle made by Rayer and Ollivier. The appearances described by these gentlemen are very similar to those which I have found in the tubercles which I have had an opportunity of examining; and they have not been more successful than I have been, in detecting any communication betwixt the morbid part and the nervous system. In these circumstances we are not, perhaps, entitled to assert that every Painful Subcutaneous Tubercle depends upon disease commencing in a nerve, however strongly we may suspect this to be the case, from the nature of the symptoms, and from the difficulty which there is in explaining them upon any other supposition.

Rayer and Ollivier are of opinion, that the disease partakes of the nature of Scirrhus; the appearances, however, of the tubercle, even as described by them, are different from those generally adopted by patho-

logists as characteristic of true Scirrhus; and the history and progress of the disease are unlike those of Scirrhus in all other situations and textures. Until this opinion, therefore, be confirmed, I think it better that the tumour should be considered as one *sui generis*, than as a modification of any of the others described by pathologists.

OBSERVATIONS

ON

NEUROMA,

WITH

CASES AND HISTORIES OF THE DISEASE.

By William Wood, Fellow of the Royal College of Surgeons, and F.R.S.E.

The term Neuroma was first applied, by Odier of Geneva, to tumours formed by diseased enlargements of the nerves *.

In a communication, lately submitted to the Society, I stated the reasons which induced me to think that the small lenticular or pisiform tumours, occasionally met with in the subcutaneous cellular substance, and which are generally believed to be formed by a morbid increase in size of a portion of one of the smaller branches of the subcutaneous nerves, should be treated of separately, and should be considered as forming a distinct variety, at least, of disease, from the deeper seated tumours of larger

* Manuel de Medecine-Pratique, &c. Par Louis Odier, Docteur et Prof. en Medecine, &c. &c. A Geneve, 1811. P. 362.

size and more rapid growth, which are ascertained to arise from, or to be intimately connected with, the trunks of nerves, or their larger branches.

Having treated very fully, in the communication above alluded to, of the smaller tumours, under the name of *Painful Subcutaneous Tubercle*, I shall now bring under the notice of the Society, some of the more remarkable cases of the larger nervous tumours, to which the term *Neuroma* may, in my opinion, with great propriety be continued to be applied.

This disease, although fortunately not of very frequent occurrence, is an extremely interesting one, both on account of the importance of the functions performed by the parts affected by it, and of the difficulty which is occasionally experienced in determining when it is safe and prudent to attempt a cure by the extirpation of the diseased parts alone, and when it is essentially necessary to have recourse to the removal of the affected limb.

Tumours of nerves are mentioned in a very vague and unsatisfactory manner by some of the older medical authors *, but many distinctly marked cases of the disease are to be found scattered about in the works of more modern writers, both British and Foreign, more particularly of some of the latter, by whom the subject has been more attentively considered, and more ful-

* Vide the works of Hippocrates, Galen, Avicenna, John de Viego, Ambrose Paré, &c.

ly treated of, than by those of this country *. Indeed, there is no general history of the disease, nor collection of cases to be found, so far as I know, in any work in our language; and it is with the view of remedying this defect, that I have attempted to form a history of Neuroma, from the cases which I have collected, and of which I shall give a detailed account.

Neuroma does not appear to be confined to any particular age, or to either sex; it is more frequently met with, however, at an early than at an advanced period of life. Of twenty-four cases, the age is mentioned in sixteen, and of these the youngest patient was twenty years of age, and the oldest seventy-three; four were above forty-six, and twelve below it. It occurs more frequently in males than in females; in fifteen cases the patients were men, in six women, and in three the sex is not mentioned.

The tumour is sometimes round, but more frequently it assumes an elliptical form; it varies in size in different individuals, and at different periods of its progress. In some cases it has been found not larger than a pea or bean; in others, on the contrary, its extent has been so great as to occupy the whole fore-arm, from the wrist to the elbow joint; but it is not often allowed to attain so large a size,

* Dissertatio Medico-Chirurgica de Tumoribus Nervorum. Fredericus Sigismundus Alexander. Lugduni Batavorum, 1810. —Dissertation sur les Affections Locales des Nerfs. Pierre-Jules Descot, Docteur en Medecine, &c. A Paris, 1825.

as, in modern times at least, it has generally become the object of surgical practice, before it has made so great progress. The general size is from that of a pigeon's to that of a large hen's egg; but it is occasionally considerably larger. There is seldom more than one tumour present at the same time; in some rare cases, however, more have been found; and, in some of these, there seems to have existed a general disposition in the nervous system to the formation of morbid enlargements.

The disease is generally met with in the course of the trunks, or of the larger branches, of the nerves of the extremities,—more particularly of the upper,—and in the neighbourhood of the elbow-joint. Occasionally it occurs in internal parts of the body, and, perhaps, if more frequent and more accurate examination was made by dissection, this disease would be more frequently found to be the cause of many anomalous symptoms. In sixteen cases the tumour was seated in the upper, and in five in the under extremities; in one in the neck; in one within the cavity of the thorax; and in one in many parts of the body.

When once formed, the tumour increases rapidly, in spite of the application of remedies, and generally attains a considerable size in the course of a very few years; it ought, therefore, to be made the subject of operation, at an early period of its progress, when the circumstances are all more favourable for obtaining a perfect cure, than afterwards.

When the affected part is examined in the living body, the tumour is found to be seated under the skin, which is moveable over it; and, in almost every case, retains its natural structure and appearance, with the exception of an increase in the size of the cutaneous vessels, particularly of the veins, when the tumour is large; in one case it is reported to have been of a purplish or livid colour. The tumour itself is extremely hard, and generally firm to the touch; occasionally it is somewhat elastic; it admits of motion to a certain degree, but principally in a lateral direction, or from the surface inwards, or *vice versa*, but hardly allows of being moved at all upwards or downwards, in the direction of the nerve. It is extremely painful upon even the slightest pressure, and the pain generally extends to the parts supplied by the nerve; so much is this the case, that the affected nerve may be occasionally ascertained, by observing what parts are pained when pressure is made upon the tumour. Thus, in several of the cases, in which the ulnar nerve was implicated in the disease, the pain was distinctly referred to the ring and little finger. Occasionally, when a smart blow is given to the diseased part, the pain is rapidly extended to different parts of the body, like a shock of electricity. In some cases there is not much pain or uneasiness when the limb is kept at rest; but, in others, there is a peculiar tickling or vermicular sensation in the parts near the tumour; in other cases, again, the patient experiences most excruci-

ating pain, altogether independent of, though much increased by pressure, in parts at a considerable distance from the tumour, but in the direction of the trunk or branches of the affected nerve. The powers of sensation, and of voluntary motion, in the parts supplied by the nerve, are, in general, wonderfully little impaired, unless by the severe pain which occurs in consequence of the pressure attending motion of the limb. Occasionally, however, there is a degree of prickling pain, alternating with numbness in the limb; and pains darting downwards in the direction of the nervous branches. Neuroma differs from painful subcutaneous tubercle, in not being accompanied with the well-marked paroxysms of pain, which take place, without any apparent cause, in the latter disease.

Neuroma has been known to arise from an injury, particularly from a bruise when the skin remained entire, and from puncture. There is a very interesting case recorded by Mr Denmark, surgeon to Haslar Hospital, in which a tumour of the radial nerve was formed, in consequence of a wound by a musket ball, part of which had been broken off, by its collision with the os brachii, and had been lodged in the nerve *. Most frequently, however, no particular cause can be assigned for the appearance of the tumour.

Neuroma may generally be distinguished from other tumours by the severity of the pain produced by pres-

* Medico-Chirurgical Transactions of London, vol. iv. p. 48.

sure ; by the pain extending, in the direction of the nerve, to the parts supplied by it; by the tumour being seated in the course of a trunk or large branch of a nerve ; by its admitting of little or no motion in a longitudinal direction, and by severe pain being excited by the attempt ; and occasionally by lancinating or prickling pain, alternating with some degree of numbness of the parts ; and by the powers of sensation and motion of the limb being to a certain degree impaired. A difficulty sometimes occurs in distinguishing tumours, depending upon diseased alteration of structure of some of the parts in the immediate neighbourhood of a nerve, from those formed in its substance or sheath ; as, from the proximity of situation, the symptoms are often very much alike. The distinction may sometimes be made, by an accurate examination of the symptoms, more particularly by attending to the effects of pressure on the tumour in different positions of the limb. Pring gives the following very interesting detail of a case of this kind.

" A woman, in wringing clothes, occasioned a strain of the elbow. A hard elastic tumour formed between the inner condyle of the humerus and the olecranon. The pain arising from this tumour was without intermission, it extended up the arm, and reached the neck ; and it prevented effectually the motions of the joint. Any degree of pressure produced an augmentation of the pain, which passed up the arm, and extended down the fore-arm, affecting particularly the two last fingers.

"It was directed, that the skin covering the tumour should be blistered, which was done without any apparent benefit. Tar ointment was next rubbed upon it, under which treatment a considerable reduction took place. About this time I first had an opportunity of seeing the woman: the swelling was not larger than a filbert; the joint had in great measure recovered its freedom of motion, but a slight degree of pressure was still productive of pain.

"When the forearm was bent, I could easily pass the tumour over the projection of the condyle; it was not, *when in this situation*, susceptible of pain by any degree of pressure. The locality of the disease was thus identified; for if the tumour had been formed in the substance of the nerve, as was suspected, the same degree of pressure would certainly have produced an equal degree of pain, whatever situation it might be made to assume. Indeed, the pain would most probably have been much greater, if the tumour was displaced, and compressed upon the condyle, than when treated in the same way in its natural situation. I believe that the direction of the pressure and its consequent effects will always afford a criterion for distinguishing between tumours which are merely contiguous to nerves, and those which occupy their own structure. If pressure be made in such a direction as to remove the swelling from the course of the nerve, the effects of compression would thus be prevented; but if the tumour were *in the nerve*, the same pressure, whatever the direction of it might be, would easily affect

the sensibility which peculiarly belongs to the structure, and which is augmented under this condition of disease.

My idea of the above case was, that an effusion had been produced by the injury of a bursa; that the irritation of continued labour had occasioned its enlargement; and that, having attained a certain size, it compressed and irritated the ulnar nerve; the phenomena of which pressure of course disappeared, when the bulk of the swelling was reduced *."

A case in some respects similar, and no less interesting, is thus reported by Sir Everard Home. "A lady, between 50 and 60 years of age, had a tumour in the breast, which was considered to be of a cancerous nature; and, as the disease was not found to extend itself into the axilla, although one gland was enlarged in that direction, the whole of the disease was believed to be within the reach of extirpation; and the operation was performed by Mr Hunter. The parts healed very kindly, and there was a very fair prospect of the patient doing well; but, unfortunately, at the end of a year and a half, a gland in the arm-pit began to enlarge, and the pain attending its increase was more severe than any thing she had before felt, even the operation itself. It was not to be allayed by opium, and nothing

* A view of the relations of the Nervous System in Health and Disease, &c. By Daniel Pring, Member of the Royal College of Surgeons, London, &c. 1815. P. 159.

could be more miserable than her existence. Under these circumstances I was consulted, and only one question was pressed upon me, whether this tumour was within the reach of being removed, without endangering her life? I had no difficulty in answering this question in the affirmative. The operation was accordingly performed. While dissecting out the tumour, a branch of a nerve was found lying before it, so much upon the stretch, that it became necessary to divide it, with a view to disengage the gland, and the patient immediately exclaimed, "You have done it, the pain is gone; cutting that cord has entirely relieved me." This dreadful pain never returned; but the disease had contaminated the parts beyond, and she fell a sacrifice to it in the course of two or three years.

"Previous to the operation, this intense pain was supposed to be entirely a symptom of the complaint*."

Tumours connected with the nerves, when carefully examined, after being removed from the body by operation, or after death, are found to exhibit very different appearances in different cases; the variety depending, in a great degree, probably, upon the original seat of the disease, and also upon the state of progress of the tumour. It is often difficult to determine, in what particular situation or texture the diseased action

* Observations on Cancer, by Everard Home, Esq. F. R. S., &c. London, 1805. P. 86.

had commenced. In some cases the morbid enlargement would appear to have begun in the cellular tissue in the proximity of the nerve, to which it had gradually extended; so that, in its progress, the nerve and its coverings had become completely involved in the disease. Unless tumours, however, which commence in textures external to the sheath of the nerve, shall come to implicate the nerve itself, they should not be considered as cases of Neuroma.

More frequently, I believe, the diseased action in Neuroma, producing enlargement and alteration of structure, commences in the neurilema, forming the external sheath of the nerve, or its connecting cellular substance; or, in the minute processes of the neurilema, which are sent off, from the general sheath, to form coverings for the different nervous fibres, or fasciculi of fibres, which, by their union, form the nerve.

Sometimes, though rarely, the diseased mass seems to consist almost entirely of a cyst containing a fluid; as in the case operated on, and reported by Cheselden. At other times, it is in part solid, and in part fluid; more frequently it is solid throughout. In one of the cases to be detailed, the tumour consisted almost entirely of a firm membranous cyst, containing a thick fluid; in three it consisted partly of fluid, and partly of a solid substance, of greater or less consistency; and, in twenty, it was entirely of a solid texture. The solid part assumes a different degree of consistence, and a different colour

and appearance, in different cases; and sometimes in different parts of the same tumour. In some instances, the whole mass is very firm and hard, of a whitish or yellowish colour, and of a fibro-cartilaginous appearance, very much like nerve, but harder, and rather more shining, resembling an enlarged ganglion.

The fibres run generally in a longitudinal direction, but are not always parallel; they seem to be to a certain degree serpentine, and are interlaced by transverse fibres, the interstices being filled up by the substance of the tumour. The fibrous structure is most apparent in the tumours when small. In other cases, one part of the mass is firm and solid, of a reddish colour, and steatomatous appearance; and in another part there are cells of a larger or smaller size, some empty, others containing either a fluid, or a softish medullary looking matter. Occasionally there is a number of small lobes distinct from each other, but closely pressed together, and all of them connected with the affected nerve. In almost all cases there is an appearance of a firm sac, more or less dense, of a shining appearance externally, not unlike tendon; it is generally thinner over the centre of the tumour than towards its extremities; and seems to be formed in part, or entirely, of diseased neurilema. In some cases the sac is loosely attached to the contained parts by thin cellular substance; in others it is firmly incorporated with them; and, sometimes it is attached to, or partially covered by, muscular fibres. The internal

surface of the cyst occasionally, particularly when it contains fluid, or soft medullary matter, is soft and pulpy, of considerable thickness, and has very much the appearance of a secreting surface.

The nerve itself is sometimes sound, immediately as it enters and comes out from the tumour; but more frequently it is more or less diseased, for some little distance both above and below, being thickened, and sometimes redder than natural, so as to exhibit an appearance of inflammation. The nerve can frequently be traced distinctly to the surface of the diseased part, where some of its fasciculi, being separated from each other, run into the substance of the tumour, in which, or in the sac, they seem to be lost; but unless the tumour be of very large size, a number of the nervous fasciculi, sometimes a good deal flattened, can be traced, in a perfect state of continuity, running over its surface, to be connected below with the trunk of the nerve, from whence they had arisen. When the tumour is very large, however, none of the nervous fibres can be traced from the trunk above to that below the tumour, there being, to all appearance, a total breach of continuity in the nervous fibres. It is in all probability to be ascribed to the circumstance of the disease affecting only a certain number of the fibres of the nerve, while others are left in a healthy state, although in contact with the tumour, that we are to explain the fact, which seems to have puzzled some of the observers of the disease, that, in many instances, the powers of sensation, and of voluntary

motion, remain very entire in the limb, beyond the tumour. That part of the nerve does remain in a state fit for the performance of its functions, when another part is much diseased, is proved by the effect of dividing the nervous trunk in the operation for the removal of the tumour; when the sensation and power of motion of the limb, which had previously been little impaired, became instantly destroyed, or much diminished. From the appearance of the internal structure of some of the tumours, they have been supposed to partake of the nature of true scirrhus; but without entering at all into the discussion in regard to the occurrence of cancer, in nerves, as a primary affection, I may state, that there is at least very great reason to doubt of the tumours in Neuroma ever being of a truly scirrhous character: first, because however large the diseased mass is, or however long it may have existed, the contiguous textures, and more particularly the skin, do not become affected with disease of a malignant kind; and, secondly, because there seems to be no tendency to a return of the complaint, after it has once been removed by operation.

Schiffner, in a very minute examination, which he made by dissection of the bodies of two brothers who had been afflicted with Cretinism, found a great many hard tumours or tubercles, of the size of a pea, in a number of the nerves of various parts of the body; these, he observes, differ from painful subcutaneous tubercles in not giving rise to the paroxysms of severe pain which characterise that disease.

It is to be remarked, however, that appearances very similar to those described by Schiffner, were found in different parts of the body of a man, who had not been affected with Cretinism; these will be detailed in a subsequent part of this communication; the preparation exhibiting the tubercles, is in the university collection of Wurtzburg.

As in some degree connected with Neuroma, it may not be considered out of place to take some notice of the small hard tumours or tubercles, which form frequently, if not always, to a greater or less extent, at or near the extremities of nerves, divided in experiments or in operations, more particularly in amputation of the extremities, and which give rise to severe pain when pressed upon. There is a preparation in the Museum of the Royal College of Surgeons here, originally belonging to the collection of Mr Charles Bell, which exhibits these tumours at the extremities of nerves divided in amputation *. There are several preparations also in the Museum of Mr Langstaff of London, taken from stumps, in which tubercles are found at different distances from the cut extremities, the distance varying from one to three inches. The celebrated Meckel gives the following very accurate and interesting account of the formation and progress of tubercles of this kind. "Les extrémités d'un nerf dont on a fait la section se

* These are represented in Plate V. fig. 3.

gonflent toujours en un tubercule plus ou moins considérable *. Ce tubercule a une couleur grisâtre; il est souvent si solide et si dur que le scalpel émousse en le coupant, et fait entendre un bruit semblable à celui que produirait son action sur un cartilage. Le volume de ce tubercule est en raison directe de l'abondance du tissu cellulaire, et du temps qui s'est écoulé depuis la blessure. Non seulement il grossit avec le temps, mais encore il devient plus dur. Celui qui garnit l'extrémité supérieure est plus petit, mais aussi dur que l'inférieur. La portion du nerf située au-dessous de la section est flétrie; elle à perdu la couleur qui la distinguait.

" Dans les amputations, ce tubercule ne paraît pas se develloper exactement à l'extrémité du nerf coupé; du moins Van Horn † a-t-il trouvé, jusqu' à un pouce au-dessus de la plaie, les nerfs confondus avec les bourgeons charnus qui naissaient des muscles, sans qu'on pût les distinguer de la masse. Un mois encore après l'opération, ils étaient rougeâtres, tant en dehors qu'en dedans, et le tubercule, qui se distinguait de l'extrémité du nerf par sa couleur blanche, se trouvait situé plus haut encore. L'extremité inférieure des nerfs se détruit donc plus ou moins, comme celle de tous les autres organes.

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* Arnemann, Ueber die Reproduction der Nerven, Goettingue, 1786. P. 48. Id: Versuche über die Regeneration der Nerven, Gottingue, 1787.

† De iis quæ in partibus membri, præsertim osseis, amputatione vulneratis notanda sunt, Leyde 1803. P. 33–35.

Du reste, on observe également les tubercules sur les grosses et sur les petites branches nerveuses, et ils paraissent persister pendant toute la vie *."

Descot says, " Il se forme, à l'extrémitè de chaque nerf coupé dans l'amputation, un tubercule ovoïde, trois ou quatre fois plus volumineux que le nerf, de la même couleur que lui, d'une consistance très-fèrme, et dont la texture, très-différente de celle du nerf, ne présente qu'un tissu fibro-cellulaire, dans lequel se perdent, en s'amincissant, les filamens nerveux, sans qu'on puisse les suivre d'une manière distincte jusqu'à son extrémité. †" He adds in a note, " M. Breschet a observé aussi que ces tubercules ne formaient pas précisément l'extrémité du nerf, et qu'au dessous il existait un cordon fibreux qui se rendait dans le tissu de la cicatrice où l'amputation avait été pratiquée."

My friend Mr Barker, surgeon, whose leg was removed a little above the ancle-joint, ten months ago, in consequence of a very severe accident, has kindly afforded me an opportunity of examining his stump.

Previously to the amputation, he suffered excruciatingly severe pain, connected with displacement of the bones at the ancle; for a long time after the operation, the pains continued unabated, and were

* Manuel d'Anatomie Generale, Descriptive et Pathologique, par T. F. Meckel, tom. i. p. 282

† P. 45.

distinctly referable to the particular parts of the ancle and foot from which they had originated, before the removal of the limb.

Even now he is subject to frequent attacks of pain, particularly at changes of the weather, which are still referred to the foot and ancle. Towards the outer side of the stump, at a little distance from the cicatrix, there is distinctly felt a small round, rather flattened tubercle, not larger than a pea, pressure upon which invariably produces the sensation of painful action in all the extensor muscles of the toes. For some time there were perceptible several other tubercles of a similar kind, pressure upon which produced pain in different parts of the foot; these are not now, however, to be discovered, even on a careful examination; but by pressure upon one part of the stump, pain is produced referable to the sole, and upon another, to the side of the foot.

It has been found in experiments made upon animals, by tying the nerves; and also upon examination of the effects resulting from nerves being included in ligatures applied to the bloodvessels, in surgical operations, that a swelling or tubercle forms in a nerve, above the part to which a ligature has been applied. Descot says, " La ligature appliquée à un nerf determine bientôt au-dessus, au-dessous et autour d'elle une effusion de matière coagulable, et particulièrement un gonflement ovoïde dans le bout supérieur. C'est à tort que Bidloo et quelques autres disent, que le gonflement existe principalement au-

dessous de la ligature : ce gonflement, dèjà très-apparent au bout de quelques jours, devient ensuite vasculaire. Le gonflement des parties environnantes se résout peu-à-peu et complètement ; celui du nerf, au contraire, persiste, et principalement au-dessus de la ligature. Ce gonflement a été retrouvé même au bout de trente ans, dans le nerf médian, qui avait été lié avec l'artère brachiale *."

Portal has the following observations upon this subject. " L'une des branches du nerf sciatique peut être comprise dans la ligature des vaisseaux sanguins qu'on pratique après l'amputation de la cuisse : alors le malade éprouve souvent, immédiatement après cette opération, des douleurs très-vives, qu'il rapporte ordinairement au bout du pied, qu'il n'a plus. J'ai vu à *Montpellier*, dans le cabinet de *Lamorier*, célèbre chirurgien, un gonflement considérable au-dessus de la portion d'une branche du nerf sciatique, qui avoit été comprise dans la ligature des vaisseaux cruraux après l'amputation de la cuisse. Le malade avoit souffert pendant plus de deux ans, d'horribles douleurs, qu'il rapportoit toujours au bout du pied, qu'il n'avoit plus. Le chirurgien *Lamorier* crut, après sa mort, en devoir rechercher la cause par l'ouverture du corps, et il trouva le gonflement et l'induration du nerf dont nous venons de parler †."

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* P. 110.

† Cours d'Anatomie Médicale par Antoine Portal. Paris 1804. P. 289.

Sœmmering has, with great appearance of truth, attributed these pains to the existence of the small tubercles above described. It has been asked, however, by Dèscot, whether they may not arise from the fibrous cord observed by Breschet, running from the tubercle to the cellular tissue of the cicatrix.

In regard to the treatment of Neuroma, it has been satisfactorily ascertained, that when the tumour is formed, it goes on increasing in size; and generally gives rise to increased suffering, in spite of any remedies, either general or local, which can be employed, and that these sufferings hardly admit of alleviation by medicine. It is highly desirable, therefore, that an operation should be had recourse to, as soon as the real nature of the disease has been ascertained; as all the circumstances are much more favourable for the accomplishment of a perfect cure when the tumour is small in size, and has formed no extensive connexions with the surrounding parts, than afterwards.

A difficulty is occasionally experienced in determining upon the nature of the operation which should be had recourse to; as, in some cases, it has been found possible to remove the tumour alone, after being dissected out of its cyst; in others it has been found necessary to remove the tumour along with the cyst, by the division of the affected nerve, above and below the diseased part; and occasionally amputation has been required. This point must be determined very much by the situation and size of

the tumour; by the nature of its connexions; and by the size of the affected nerve. Where the tumour is not extremely large, nor connected with large bloodvessels, or nerves essentially necessary for the sensation and power of motion of the affected limb, the nerve should be divided above and below the diseased part, and the tumour removed with the cyst entire; care being taken that the nerve be divided at its upper part first, and as early in the operation as possible; by which means, the pain of the operation, which is often very severe, is considerably diminished. This is an operation which has been proved to be a perfectly safe one, and has often been practised with complete success. When the tumour occurs in the hand, arm, or fore-arm, which are by far the most frequent seats of the disease, some temporary inconvenience has been found to result from the destruction of the nerve, in the loss or the diminution of sensation, and the power of motion in particular parts; but this does not take place to a great extent, nor is it permanent, as a gradual and progressive improvement generally begins to take place soon after the operation; and, in many of the cases, the whole powers were recovered; in the others, to so great an extent, as to leave a very useful limb. In only one case has an operation been reported to have been performed for Neuroma in the axilla. In this case, no bad effects resulted as to the use of the arm or hand; the patient died; but the tumour was removed from its cyst by a tedious dissection; and the death may perhaps be

ascribed more to the general constitutional affection caused by the inflammation excited amongst the important parts seated in the axilla, than from any thing peculiar in the nervous connexion of the tumour. It is worthy of consideration, at least, how far the result might have been different, if it had been possible to have removed the tumour, along with its cyst, by the more simple operation of dividing the affected nerve in two places.

There is only one case with which I am acquainted, in which an operation was performed for a nervous tumour in the ham; in this, from its size and connexions, it was deemed advisable to remove the limb. It remains a question, however, how far it might be right to attempt to save the limb, in a case of Neuroma in the ham, where the tibial or fibular nerve alone is affected, and where the tumour could be wholly removed by the division of one nerve, the other and the bloodvessels being left entire. The operation would, in all probability, be a tedious and difficult one. It may be here remarked, that, in both of the cases in which the disease existed in the ham, the tibial nerve alone seemed to be affected, and the fibular to be sound.

There can be no doubt, I conceive, of the propriety of removing the tumour when seated in the foot or leg, or in the hand, arm or fore-arm; and it may be more safely done by bringing away the tumour along with the cyst, by cutting the nerve in the sound part above and below, with as little disturbance as possible to the surrounding parts, than

by dissecting out the tumour from its cyst, even when that can be done. When the disease, however, has been allowed to attain a very large size, so as to occupy great part of a limb, and to involve, to a great extent, the parts contiguous to the nerve, it appears to be a more safe practice to remove the limb.

It is not probable that any attempt will be made, in the present days, to cure Neuroma by making an incision into the diseased parts, for the purpose of causing their destruction by suppuration; as in the only case in which this was attempted, no advantage whatever resulted from the operation, which was an extremely painful one; and, even if the patient had continued to live, there was no probability of the wished for effect being produced. If the whole of the morbid parts cannot be removed with safety, it is far better to have recourse at once to amputation of the limb.

In looking into the twenty-four cases of well-marked Neuroma, which I have been successful in collecting, I find they give the following general results. In eight cases the operation of excision was performed with success. In two, the patients died after this operation; it is to be remarked, however, that in one of them the patient was 73 years of age, and at the time in an unfavourable state of health for undergoing any operation. In four, amputation was successfully performed. In three, no operation was had recourse to. In three, the tumours were accidentally met with in dissection. In two, the

disease was seated in internal parts of the body. In one, the tumour was laid open, with the view of bringing on suppuration; in this case the patient died, it is said, of intermittent fever of the quotidian form, twelve days after the operation. In one the disease was cured by the destruction of the nerve by the application of caustic.

I shall now proceed to give an account of the cases which I have collected. I am afraid that the detail may appear tedious; but I find it impossible to give any abstract of them, without incurring the risk of doing injustice to the medical men by whom they were treated, or are reported.

Cheselden is the first author, who, so far as I know, has given a distinct account of the disease. There is a representation in his work of a nervous tumour, of which he gives the following description:

CASE I.—"A tumour formed in the centre of the cubital nerve, a little above the bend of the arm; it was of the cistic kind, but contained a transparent jelly; the filaments of the nerve were divided, and ran over its surface. This tumour occasioned a great numbness in all the parts that nerve leads to, and excessive pain upon the least touch or motion. This operation was done but a few weeks since; the pain is entirely ceased; the numbness a little increased; and the limb, as yet, not wasted *."

* Anatomy of the Human Body, by W. Cheselden, 10th edit. Lond. 1773, p. 256.

The next case is taken from the Encyclopedie Methodique de Chirurgie.

Case II.—" Une Demoiselle, de vingt deux ans, portoit sur la partie interne de l'avant-bras, une tumeur, qui avoit commencé quatorze ans auparavant, par une petite dureté, située à-peu-pres à egale distance du pli du coude et du poignet, et qui paroissoit avoir son siege sur le ligament interosseux. Aucune cause manifeste n'avoit donné naissance à cette affection, que l'on crut cependant pouvoir attribuer à une chute, qu'avoit faite la malade quelque tems auparavant. La tumeur fit des progrès, malgrè des tentatives sans nombre pour la dissiper, et son volume ne cessa jamais de s'accroitre dans toute sa dimension. On avoit consulté de tous cotés les praticiens les plus distingués ; on s'etoit aussi adressé à des charlatans, un de ceux-ci eut la hardiesse d'appliquer sur le mal un caustique par lequel il pretendoit avoir gueri beaucoup de tumeurs : mais, lorsqu'il eut fait une playe aux tegumens, on vit qu'il avoit mis à decouvert une partie des muscles et des tendons de l'avant-bras, et on ne lui permit d'aller plus avant. On fit sur la playe les applications convenables, et elle se cicatrisa plus heureusement qu'on n'avoit osé l'espérer.

Après avoir inutilement tenté une multitude de remèdes, on renonça absolument à en faire de nouveaux : on se flattoit que la tumeur cesseroit enfin de prendre de l'accroisement ; et comme la malade se servoit toujours de son bras malgré le poids enorme qu'il avoit acquis, on écartoit l'idée de l'amputation, à laquelle neanmoins on sentoit que l'on seroit probablement obligé, tot ou tard, d'avoir recours. La tumeur n'etoit pas douloureuse habituellement : mais la malade y eprouvoit des douleurs lancinantes, qui se faisoient sentir particulièrement aux deux extrémités, et sur-tout inferieure ; ces douleurs devenoient avec le tems toujours plus fréquentes, et plus vives. Enfin le volume de la tumeur s'etant accru au point qu'elle occupoit tout l'avant-bras depuis le coude jusqu'au carpe, et qu'elle avoit au moins six pouces de diametre dans son milieu, sa surface lisse et uniforme devenant un peu plus inégale, sa dureté jusque la paroissant diminuer dans quelques points, et les elancemens douloureux augmentant en fre-

quence et en intensité, la malade vint à Paris, ou, d'apres l'avis unanime de plusieurs personnes de l'art, elle se soumit à l'amputation du bras, qui fut faite à quatre pouces environ au-dessus du coude. L'operation, faite par le celebre Louis, fut suivie du plus heureux succes, et la malade acquit bientot après un degré de santé dont elle n'avoit pas joui depuis bien des années.

Après l'operation, on examina la tumeur, on la trouva partout environnée sous les tegumens par les muscles qui formoient autour d'elle comme un fourreau, et sous les muscles par un kyste particulier formé par une membrane très-fine, et demi-transparente; sur laquelle on voyoit un grand nombre de vaisseaux lymphatiques très-considérables. Les vaisseaux sanguins de la partie, et particulièrement les veins cutanées, etoient aussi excessivement dilatés. A l'ouverture du kyste, la tumeur parut se diviser en plusieurs masses plus ou moins considérables, enveloppées chacune en particulier par une membrane de la même nature que celle qui enveloppoit la totalité. Chacun de ces masses etoit composée de plusieurs lobes fortement serrés les uns contre les autres, la plupart d'une forme vermiculaire et de la grosseur du doigt, ou à-peu-près, variant beaucoup entr'elles pour la longeur. Chacune de ces lobes avoit un pedicule tres-delié, qui etoit une branche du nerf radial autour duquel ils etoient tous fixés a-peupres comme de raisins le sont à la grappe. La substance de ces lobes ferme et compacte, homogène, jaunâtre, un peu transparente, paroissoit formée presque en entier par la lymphe coagulable: on ne pouvoit y appercevoir aucune organisation.

Telle étoit surtout la partie supérieure de la tumeur; la partie inférieure, c'est-à-dire depuis le milieu à-peu-près de l'avant-bras, jusqu'au poignet, etoit un peu différente; on y voyoit le tronc même du nerf radial affecté dans son entier; en sorte que ses fibres, qui dans l'etat naturel s'avancent parallelement vers la main, etoient separées les unes des autres, excessivement épaissies jusqu'au ligament annulaire du carpe, et reprenoient, en cet endroit, leur apparence naturelle pour former le nerf qui s'avance sous l'aponéurose palmaire. La matière de la tumeur etoit d'ailleurs la même dans toute son etendue, si ce n'est qu'en plusieurs points

elle paroissoit un peu plus rouge, moins dure, et sembloit avoir contracté un degré d'inflammation.

On ne trouve, nulle part que je sache la description d'une tumeur pareille formée uniquement par le gonflement d'un nerf, toutes les parties environnantes etant d'ailleurs dans un état très-sain. C'etoit une chose assez etonnante qu'une affection pareille du nerf radial, n'en eut point alteré les fonctions, la malade s'etant toujours servie de sa main autant que l'embarras, resultant du volume de la tumeur, le lui avoit permis; cette main etoit, il est vrai, un peu plus petite, que l'autre, mais elle n'avoit rien perdu quant à la sensibilité, et au mouvement des doigts. Cette circonstance conduisit à supposer que la nerf n'etoit pas affecté dans sa substance meme; mais seulement dans ses enveloppes, supposition que toute la dexterité du savant anatomiste M. Pelletan, chargé de la dissection du bras, ne peut point confirmer. Si l'on peut se former d'avance une idée de la nature de la tumeur, et sur tout si l'on eut pu juger qu'elle etoit parfaitement enkystée, peut-etre auroit on tenté de l'enlever par la dissection, et de sauver ainsi le bras; mais outre qu'on ne pouvoit avoir aucune notion, à cet egard capable de diriger le chirurgien, on auroit tout lieu de craindre que cette operation ne fut sans succes, soit à cause de la vaste etendue de la playe qu'on auroit été obligé de faire, soit à raison de la destruction du nerf principal de l'avant-bras, dont les fonctions n'eussent probablement été que difficilement suppliés par le nerf cubital, et les autres branches que se rendent à cette partie *."

The two following cases are detailed by Sir Everard Home.

Case III.—"A lady, 20 years of age, had a tumour on the outside of the biceps muscle of the right arm, just below the middle. It was of the size of a small pullet's egg, of an elliptical form, and moveable in the surrounding parts, but principally in a lateral direction. It was extremely painful when any thing pressed against

* Encyclopedie Methodique Chirurg. Par de La Roche et Petit Radel. Paris 1792. Tom. ii. p. 442.

it, which made her very careful in defending it from external accident. It had been several years in arriving at this size, but was now increasing more rapidly, which induced her to submit to have it removed.

"The operation was performed by Mr Hunter, in which I assisted him. In the operation, handling the tumour, or removing it from its place, gave the most excruciating pain. When the tumour was fully exposed, it had a smooth, shining, external surface, and terminated at its *upper and lower* ends in a strong white cord, which proved to be the musculo-cutaneous nerve. Upon cutting into the tumour, it was discovered to be inclosed in the nerve. This discovery was not made till the tumour had been every where laterally dissected from the surrounding parts. It was therefore thought prudent to remove the whole, by dividing the nerve at the two ends of the tumour. The artery belonging to the nerve bled so freely, that it became necessary to apply a ligature on both the cut ends of the nerve, as the artery itself could not be got at. An attempt was made to heal the wound by the first intention, which did not succeed; but it got well as soon as wounds of that size usually do, by suppuration and granulation. The patient lost the use of her forefinger and thumb, and there was a numbness in all the parts supplied by that nerve. The skin which covered them was unusually rough and dry, and the cuticle came off in small scales. Before the operation, the pain was not confined to the tumour, but extended to all these parts. On examining the tumour, it was found that three inches in length of the nerve had been removed; that it was divided into two portions, each of them very much flattened, and passing over two opposite sides of the tumour. There was also a nervous expansion not thicker than a common membrane, which completely invested the whole of the tumour; and when that was divided, it could be readily separated every where, except at the *extremities*, where the connection was somewhat stronger.

"When the tumour was divided, and the cut surface accurately examined, it had the appearance, in the centre, of serpentine ner-

vous fibres running in the course of the nerve. These were separated from each other, and the interstices filled up with the substance of the tumour; but that part of the tumour which was exterior to these fibres had something of a radiated structure."

CASE IV.—"Peter Coillot, a Frenchman, 35 years of age, was admitted a patient under my care, in St George's Hospital, July 13, 1796, with a tumour, *which was situate in the middle of the hollow* between the two folds of the *armpit*. When the arm was hanging down, it projected very little; but when the arm was raised, it became very prominent, that position of the parts bringing the tumour forward. It admitted of lateral motion, which was, however, very confined, being just sufficient to ascertain that it had no firm connection with the parts behind.

"The first symptom which he felt was a darting pain in the fingers of that hand. This came on in July 1795, and increased from that time; but the tumour in the armpit was not discovered till June 1796, and was then as large as a small pullet's egg. When he came into the Hospital, it was more than double that size. The pain he felt in the tumour and in the arm was very severe. This was very much increased by any pressure against the tumour.

"Its relative situation to the great nerves and bloodvessels, its obscure motion, and the uncommon degree of pain which it occasioned, were unfavourable circumstances for an operation. I was therefore induced to try a variety of means to relieve the symptoms, but these proving ineffectual, and the pain becoming worse, the removal of the tumour seemed to be the only means left that could give him a chance of getting well. To this the man most cheerfully submitted, as he declared that his present sufferings were insupportable.

"During the operation, the arm was raised as high as possible, to bring the tumour fully into view. Upon dividing the skin and the cellular membrane, the first object which presented itself was the axillary vein stretched over the anterior surface of the tumour. This was drawn to one side, and retained in that situation. When

the tumour was laid bare, it was found to have a smooth external surface, and the end next to the arm terminated in a strong white cord. When this was pulled, it did not give pain in the part itself, but the arm felt overstretched, and gave him the greatest uneasiness. This circumstance brought to my recollection the case of the young lady above related, and led me to consider this to be similar to it. I therefore cut through the external covering of the tumour, which was only a thin membrane, and dissected off a considerable portion of it. This enabled me with the finger to detach the remainder of the tumour from its covering, and entirely to disengage it, upon which it was immediately expelled by the action of the surrounding muscles. No hæmorrhage ensued, and the parts were superficially dressed. The patient immediately after the operation felt relieved from the distressing symptoms he before complained of.

The tumour was of a yellowish-white colour, about three inches and a half long, two inches thick, and of an oval form. When cut through, it was found to consist of a whitish very firm substance; in the centre of which there was a very obscure fibrous structure; and towards the outer surface the texture was indistinctly radiated. The day after the operation, the patient was free from pain, and could move his fingers without uneasiness. He continued going on well till the fourth day, when he lost his appetite, had an unusual heat in his skin, and his *pulse exceeded its natural frequency*. On the fifth day he was nearly in the same state; on the sixth his pulse was *quick*, and had a sharpness in the stroke. His skin felt hotter than before, and he had a præternatural thirst; his spirits were depressed, and he felt persuaded that he should not recover. On the next day, in the forenoon, he died.

On examining the parts after death, the tumour was found to have been incased in one of the large nerves which form the axillary plexus: the principal substance of the nerve passed along the posterior surface of the tumour. There were also some other branches much flattened, and, as it were, imbedded in the nervous expansion surrounding the tumour. The cyst was now much

contracted, and more than four times thicker than at the time of the operation. *In consequence of having been inflamed,* the cavity was lined with coagulated lymph, and almost filled with coagulated blood, as suppuration had not completely taken place. The inflammation and swelling had extended some way into the surrounding parts, which were also consolidated into one mass, and with difficulty separated by dissection.

The other parts of the body were found in a natural state, so that there was no evident cause of death, but what arose from a considerable degree of inflammation, upon the substance of a large nerve, for three inches in length, which also affected the other nerves of the plexus.

A similar tumour had formed in one of the other nerves, but was much smaller in size. It lay directly between the axillary artery and the tumour which had been removed. In this situation, it prevented the pulsation of that artery from being felt during the time of the operation, which I was before at a loss to account for.

The structure of this tumour was exactly similar to that from the arm of the young lady, except that the nervous fibres in the centre were rather more distinctly seen, the spiral direction of the fibres being readily distinguished by the naked eye; *in other respects,* it was exactly the same. The want of distinctness in those of the larger tumour may therefore be reasonably supposed to be the effect of the increase of size by which they were rendered obscure *.

Odier, in describing Neuroma, says,

Case V.—" C'est heureusement une maladie rare; mais j'en ai vu dans ma famille même un cas remarquable, qui m'a douloureusement occupé pendant bien des années, et dans lequel l'augmentation graduelle du mal, malgré un nombre infini de consultations et de remèdes, a enfin nécessité l'amputation du bras.

* Transactions of a Society for the Improvement of Medical and Surgical Knowledge, vol. ii. p. 152. London, 1800.

A l'ouverture, la tumeur se trouva être une espèce d'anevrisme du nerf radial, dont tous les filets, etoient écartés les uns des autres à l'extérieur en forme d'éventail, ou comme les côtes d'un melon; tandis que le centre étoit rempli d'une matière blanchâtre, qui en quelques endroits avoit un peu jauni, et qui etoit épanchée dans les intervalles d'un nombre infini de vaisseaux transparens entrelacés les uns dans les autres. C'est communement au poignet que se forment ces tumeurs *."

Case VI.—Dr Spangenberg had an opportunity of examining a tumour of this kind, of the size of a small walnut, which M. Dubois had extirpated in his presence from the knee-pan of a lady. After he had cleared away the cellular membrane and fat from the tumour, he saw the cutaneous nerve run out from the middle of it, upwards and downwards. In order to see if there might not be a gelatinous exudation or nervous accumulation in the nervous membrane, as was seen by Boërhaave, Morgagni and others, he divided the swelling longitudinally down to the middle; but it remained hard and compact as before, and, on pressure, no drop of moisture exuded from it. He then divided it longitudinally into two equal parts; one of these he laid in soap-boilers' leys; after fourteen hours he washed it in water, and pressed out the medulla, without its having any perceptible influence on its size, consistence, and weight. The other portion was left lying for seven days in weak nitric acid, in which it soon shrunk up; on its being washed in water, nothing but the hardened medulla remained behind, which was scarcely a twentieth part of its former size. This swelling, therefore, Dr Spangenberg concludes, depends on thickening of the membranes of the nerves.

The following case Dr Spangenberg extracted from Dubois' Journal:

* Manuel de Medecine-Pratique, &c. par Louis Odier. Docteur et Prof. en Medecine, &c. 2de edition, p. 362.

† Horne's Archiv. 1804. Band v. s. 309.

Case VII.—"The inspector of mail-coaches at Paris had, for about a year, on his right arm a compact, firm swelling, of the size of a small melon, which began immediately under the elbow-joint, and extended to the root of the hand in the course of the median nerve of the arm; above it was broad, but it became gradually smaller below, and, when the arm was slightly bent, it possessed a considerable degree of mobility. The skin was not discoloured, nor tight, but rather loose. M. Dubois made a longitudinal incision along the whole tumour, extended it upwards and downwards, and obtained the necessary space by a crucial incision on both sides. The tumour had pushed the muscles somewhat to the side, and lay partly uncovered. The whole tumour was dissected out, without any considerable loss of blood; and the healthy ends of the median nerve divided above and below. The wound healed in about three weeks. The patient sustained no other injury from the operation, than that he lost sensibility on both sides of the finger. In other respects he could use his arm as before." "The character of the tumour," adds Dr Spangenberg, "was, from Dubois' oral description, similar to the one which I myself examined *."

Case VIII.—In the Anatomical Museum of the University of Wurzburg, there has been prepared and preserved, by the care of Dr Hesselbach, Prosector at the Anatomical Theatre, a pretty considerable tumour, more than an inch in its greatest diameter, attached to the ulnar nerve, which was found in the body of a day-labourer. It is of the size of a small apple, and somewhat flat; it lay between the Aponeurosis palmaris, the M. palmaris brevis, and between the muscles of the little finger, to which it was strongly attached. The exact seat of this swelling is in the cellular membrane of that twig of the ulnar nerve which goes to the little finger. On being divided longitudinally, it was found to bear a considerable resemblance in substance and colour to the ovaria. At one place, in particular, a number of small cells are observed,

* Horn's Archiv. 1804. Band v. s. 311.

which are very similar to the vesicles or ovula in the ovaria. Some of these are hollow, others are filled with a clear yellow firmish substance; immediately around these cells there lies a brownish, and next again a greyish ring, which is then lost in the rest of the substance. The nerve, as it enters, becomes gradually flatter, broader and thicker, and is, at last, lost on the upper surface of the swelling, forming a groove-like angle at its entrance into it. The swelling on several parts of its upper surface is wrinkled, and has a white, shining and smooth appearance *."

Dr Alexander is the first writer who has given a full and accurate general history of nervous tumours; he has quoted a number of cases recorded by former authors, and has added the two following original ones:

CASE IX.—" T. Siegel annum agens undevicesimum, cohortis octavae miles, habitu et conditione corporis satis bonâ gaudens, at infantile ætate affectione scrophulosâ vexatus, die 10. Februarii 1804 Nosocomium Militare Leidense ingreditur, febre laborans intermittente. Hac sanatâ propullavit scabies, glandulæque in variis corporis partibus observabantur tumescentes. Adhibitâ medendi ratione aptâ, mense Julii ad pristinam rediit sanitatem.

" Querebatur interea de tumore ipsi molestissimo, quem inde a sexennio in brachio sinistro gerebat. Post pulsam ægritudinem corporis universalem, opportunum demum censuit Reichius V. Doctiss. mali illius localis et chronici, quod cum præcedenti morbo nexum nullum habebat, curam esse suscipiendam.

" Retulit æger, tumorem hunc in facie inferiori atque interna brachii sinistri, haud longe ab antibrachii articulatione in viciniis arteriæ brachialis, nunc voluminis et formæ ovi gallinacei conspicuum, ante hos sex annos primum propullulasse, magnitudinis eo tempore pisi, illum inde in hunc usque diem sensim mole fuisse adauctum, se autem causam mali occasionalem ignorare.

" Tumor cæterum cute sanâ et mobili tectus erat, elasticus, ad

* Siebold's Beobachtungen. Band i. s. 82.

minimam pressionem resiliens, liquore turgere videbatur; in utrumque latus nonnihil poterat moveri, at nec in superiora nec in inferiora cedebat. Sibi relictus, et ab omni pressione liberatus, vix ab ægro percipiebatur, qui ex minimâ pressione aut qualicunque externâ injuriâ in illum illatâ dolore immani afficiebatur. Malum jam ab initio admodum fuisse sensile, at vero sensilitatem cum volumine continuo incrementa cepisse narravit.

" Doloris sensus juxta decursum nervi cubitalis, imprimis se extendebat in inferiora versus digitum annularem et minimum. Dolor cum non admodum vehemens esset, vel etiam si hic modo vehementissimus sensim cessaret, in memoratis digitis de titillatione, vel motu quasi vermiculari, æger querebatur. Nullorum musculorum motus erat læsus, omnes digiti facile et libere movebantur, calor etiam in toto brachio et manu erat naturalis.

" Vocatis a Reichio V. Doctiss. in consilium Pelugio et Sebastiano Collegis Doctiss., Chirurgis hujus Nosocomii quoque primariis, mihi quoque in disciplicâ medicâ præceptoribus exoptatissimis, huic consilio adesse quoque dignatus fuit Brugmansius V. Cl. rei medicæ militaris præfectus. Unanimi consensu habitus fuit tumor sedem occupare in ipso nervo cubitali, nullumque aliud superesse remedium præter illius extirpationem.

" *Die* 8 Julii operationem instituit Reichius V. Doctiss. sequenti modo. Cute elevatâ in plicam transversalem instituta sectio est longitudinalis, longitudinis quinque pollicum, ut tumor ita nudatus ac integer coloris albi et superficiei nitentis in conspectum prodiret. A partibus vicinis fuit solutus, quo facto, licet plures arteriolæ abscinderentur, vix tamen alicujus momenti hæmorrhagia sequebatur.

" Ita apparuit recte sese habuisse diagnosin; et revera tumorem in ipso nervo ulnari locum habere.

" Sectione supra et infra locum tumentem factâ, universus tumor fuit ablatus, ita ut pars nervi longitudinis quatuor pollicum separari debuerit.

" Doloris admodum plena hæc operatio erat præ tumoris imprimis sensilitate, et ipsa nervi divisio dolorem ad gradum summum evehere videbatur; factâ scissione, non quidem dolor nox cessabat, sed minuebatur tamen, et quasi indole mutabatur, dum eodem tempore,

momento citius in totâ manu sensus, calor et motus voluntarius peribant.

" Elapsis inde ab operatione aliquot horis, redibant hæc in manu hæ movendi ac sentiendi facultates; solius autem digiti annularis facies externa, et totus digitis minimus insensiles, frigidi, nec ad voluntatis nutum mobiles manebant.

" Absolutâ operatione, post purgatam a sanguine plagam, labia vulneris ad invicem adducebantur, fasciolis emplastro adhæsivo obductis firmabantur, ac linteo carpto fasciâque in similibus casibus adhiberi solitâ munichatur brachium.

" Ob dolores perpesses opii parva dosis fuit adhibita. Febris consensualis vix ac ne vix quidem sequebatur, et symptomatibus systematis nervosi affecti liberatus æger mansit.

" Secundâ ab operatione die, tumebat ex inflammatione, moderatâ tamen, omnis vulneris ambitus.

" Fomentum ex aqua vegeto-minerali fuit adhibitum. Cum dolore lente minuta inflammatio fuit levisque secuta suppuratio.

" Post paucos dies sensim sensimque sensus, motus et calor ad digitum annularem redibant, et post 14 ab operatione dies, etiam digitum annularem poterat movere æger, sed sensilitas in hoc digito minimo adhuc desiderabatur, quæque die sexto Septembris 1804, cum ex nosocomio dimitteretur sanatus, non nihil jamjam redierat, nondum tamen penitus restituta erat.

" *Die* 16.—Bonâ cicatrice clausum erat vulnus, nullæque mali supererant reliquiæ, præter memoratam in digito minimo, minutam sensilitatem.

" *Examen tumoris ablati.*—Tumor telâ cellulosâ adhærente caute liberatus, expansum ita nervum exhibuit, ut neurilema extimum ejus involucrum constituerit. Cubitalis nempe nervus, supra tumorem per longitudinem dimidii fere pollicis abscissus, visus fuit sanus ad locum dilatatum usque, quemadmodum sanus etiam apparuit mox infra tumorem, ad cujus partem infimam etiam pari longitudine dimidii pollicis fuit relictus.

" Color tumoris idem ac nervi erat, tamen aliquantulum magis splendens. Cæterum vel oculo nudo fibræ distinguebantur longitudinales interjectis paucis transversalibus. Ad tactum erat sub-

durus, elasticus, et fluidum intus latere nunc facilius quam antea sentiebatur.

" Incisione in longitudinem factâ, exterior paries parietis nervi jam longe erat durior, consistentiæ quasi tendinosæ, vix tamen cartilagineæ.

" Quam primum vulnusculum fuit inflictum ad interiora penetrans, liquor tenuis, limpidus, sero sanguinis satis similis, et seri instar etiam concrescens effluxit, ita quidem ut humore hoc per tunicæ externæ elasticitatem expresso, tumoris volumen tertia sui parte fuerit imminutum.

" Dilatatâ per totam longitudinem aperturâ, tumoris paries exterior sese obtulit, ut continuatio neurilematis nervi sani. Eâ parte, quâ nervo erat proximus, hoc est, ad partem superiorem paries hic exterior tumoris admodum erat durus et crassior redditus quam ad nervum sanum esse soleat. Versus medium autem tumoris, qua parte in amplissimam diametrum erat expansus, in tenuem membranam, at tamen egregie firmam extenuatus reperiebatur.

" Ad faciem internam hujus parietis seu involucri ex neurilemate facti, oculo armato fibræ observabantur subtiliores, atque parallelæ.

" Cavum interim, ratione memorata ex neurilemate formatum, lamina ab omni parte densa pulposa singulari ita tegebatur, ut ad medium seu centrum tumoris cavum supereresset ovi adinstar oblongum, quo liquor serosus latuerat, et qui, aperturâ factâ, effluxerat et in exteriora totum tumorem æquabiliter urserat.

" Pulpa singularem meretur attentionem.

" Non qualis in nervo sano est, hæc videbatur copia tantum et volumine aucta in tumorem continuare et a parte inferiori in nerveam pulpam sanam dein rursus contrahi; sed ad natum tumorem pulpa sana videbatur desinere, et limite facile observando posito, illa in tumore nova morbosaque facie induta conspiciebatur.

" Hæc nimirum pulpa tunicæ tumoris externæ adhærens, ut dictum, crassitiem fere habebat dimidii pollicis, fibras obtulit rectas decurrentes et parallelas nullas, sed corpuscula rotundata, constantia et involuta quasi fibris convolutis, intestini-formibus, glomeratis, numerosissimis, proxime convenientibus cum illis, quæ Fontana

V. Cl. microscopii beneficio, in substantia nervorum medullari et corticali cerebri observavit et delineanda curavit.

" Cum his corpusculis filisque conglomeratis circumvolutisque tota tumoris nostri pulpa proxime congruebat, hac cum differentia, quod oculus nudus, vel parum saltem armatus, accurate distingueret, quæ in nervo sano et cerebri cortice, Fontana demum microscopio objectorum longe magis amplitudinem augente, distinguere potuit.

" Hæc omnia quæ fabricam hujus tumoris spectant, mecum a Brugmansio V. Cl., benigne communicata in præparato, quod ejusdem in musæo servatur, hoc ipso tempore (Ao. 1810) adhuc cernere est."

Case X.—Observatio secunda.

" Vir nobilissimus G——, plena cæteroquin atque firma sanitate valens, constitutionis robustioris, nunc annum agens quadragesimum et quartum, ante 12 et quod excurrit annos, cubitum dextrum impetu adeo magno in acutum lapidem impegit, ut dolore acutissimo e contusione percepto, quasi fulminis ictu in terram perculsus, aliquot horarum spatio sensuum usu privaretur.

" Cum nemo adesset qui opem ferre posset, post aliquam moram ad se sponte rediit, dolorem sentiens in loco adfecto violentissimum. Chirurgus ad auxilium ferendum vocatus, levioris tantum contusionis indicia externa potuit detegere, nullam autem læsionem, quæ doloris magnitudini responderet.

" Solitis remediis admotis, contusionis externæ noxa paucorum dierum spatio sublata fuit, superstite tamen doloris sensu acutissimo, quoties locus læsus tangebatur, cum tumore exiguo initio parum manifesto. Ab eo tempore tumor lente fuit auctus; et doloris sensus, quoties premebatur non fuit imminutus.

" Interea æger præ tumoris sensilitate dextri brachii usu fere privatus, a multis chirurgis, quos inter illustriores plures erant, auxilium petiit. Externa medicamina præscripserunt indolis diversissimæ, quorum tamen nullum vel minimum attulit emolumentum. Adiit die 21 Maji 1809 Reichium V. expertissimum, hujus auxilium petiturus.

Tumoris nunc ratio hæc erat. Hærebat tractu obliquo supra

cubitum dextrum ad condyli ossis humeri latus externum, longitudinis erat duorum pollicum, latitudinis fere dimidii, et ad trium linearum altitudinem e cutis eminebat superficie. Cutis imposita ad tumorem mobilis, coloris erat ex livido purpurascentis.

" Ingentis erat sensilitatis malum, ut vel ad levissimum attactum dolor acutissimus perciperetur, cujus sensum per universum corpus sese diffundentem, æger cum ictu electrico comparabat; cæterum si non premeretur vel allideretur quocunque modo, non quidem dolebat; attamen cum admodum esset difficile omnem evitare externam affectionem, creabat nihilominus insignem molestiam, ita ut vix ad usum posset vel auderet dextrum brachium vocare.

" Doloris vehementia longe erat intensior, si a superioribus in inferiora, aut ab inferioribus in superiora chirurgus tumorem movere conaretur, quam si in alterutrum latus illum diduceret. In consilium vocabatur Brugmansius V. Cl. qui cum Reichio V Doctiss. eandem fovebat opinionem, sedem morbi in affecto esse subcutaneo nervo, omnemque sanationis spem in extirpatione esse positam. Lubenter æger sese operationi subjecit. Ad minuendam interim sensilitatem non sine aliquo levamine per aliquot dies fomentatio, ad sequentem formulam præparata, adhibita fuit.

" ℞ Extract. Saturni ʒi
Opii puri ℈i
Aquæ Pluvial. ℔ij.—M.

" Die 12 mensis Junii 1809, Reichius V. Doctiss. præsentibus Brugmansio V. Cl. et La Lau V. Doctiss. Med. Doctore, hac in urbe Praxin feliciter exercente, nonnullisque commilitonibus, quibus et interesse mihi contigit, operationem sequenti modo instituit.

" Elevata in plicam transversalem ad tumorem communia integumenta, alterâ parte ab adjutore, alterâ parte ab operatore prehensa ad longitudinem tumoris incidebantur. Sectio in superiora et inferiora extendebatur, ut totus tumor, cum tela cellulosa copioso adipe granuloso farcta, propullularet. Nervi ramuli per hanc telam cellulosam sparsi, et in sacculos quasi per morbum dilatati, aperiebantur facillime humoremque serosum effundebant.

" Adiposa hæc lamina, una cum nervosis ramulis, per morbum affectis cultro auferebatur, ut ligamentum capsulare nudum spectaretur. Nullius momenti sequebatur hæmorrhagia, sed æger immanes dolores, singulari animi fortitudine perpessos, expertus fuit, donec ablatus fuerit tumor, quo facto sine molestia ulteriori mox digitis universa plaga tangi atque explorari potuerit. Mundato a sanguine coagulato vulnere, hujus labia sibi fuere admota et quinque striis ex emplastro adhæsivo firmata, spleniis, fascia denique atque ferulâ cubitus fuit ita sustentatus, ut brachium flecti non posset et situs horizontalis ipsi foret facilis.

" Nulla febris consensualis, nec ullum aliud symptoma molestum est secutum.

" Ad minuendam inflammationem tertio post operationem die, fomentatio fuit adhibita ex aqua vegeto-minerali, cujus usus per aliquot dies fuit protractus.

" Octavo die dum nova applicabantur emplastra, jam cicatrice maximam partem vulnus erat firmatum.

" Die decimo tertio ad partem inferiorem vulneris, exigua tantum supererat superficies nondum coalita. Huic Balsamus Peruvianus niger applicabatur, et post biduum clausa plaga erat.

" Ne cicatrix nondum satis firmata violentiori motu iterum disjungeretur, pedetentim ac debitâ sub cautelâ, ut brachium moveret ac flecteret, ægrotanti fuit concessum.

" Post paucas hebdomades quosvis perficere potuit sine ullâ molestiâ aut dolore, brachii motus, et post elapsos decem menses (dum hæc scribo) nullus amplius vel de præcedenti malo, vel de operatione superest sensus.

" Cum sedes morbi in tenuissimis esset ramulis nerveis subcutaneis, examini anatomico tali accurato tumor se non præbuit, quali occasionem dederat ille, de quo in observatione præcedenti dictum fuit.

" Constitit tamen satis, fibrillas nerveas dilatatas ac loco tumente liquore seroso repletas, externam tunicam exhibuisse induratam, qua aperta, cum nunc liquor ille effluxerit, tractus duriores, et quasi tendinosi superstites conspiciuntur *."

* " Dissertatio Medico-Chirurgica de Tumoribus Nervorum, Fredericus Sigismundus Alexander. Lugduni Batavorum 1810."

In the Museum of the Royal College of Surgeons here, there is a very valuable preparation of Neuroma which occurred in the ham. Mr Charles Bell, who preserved the parts, has given the following very interesting history of the disease; and there is an engraving of the diseased parts in his work upon Operative Surgery.

CASE XI.—"About three years before I saw the subject of the following case, he had fallen from the side of a ship. It happened in this way. Seeing his fellow workman falling, he threw himself forward to break his fall, and succeeded, but in doing this he fell himself; for he was caught by the ham on a projecting bolt in the side of the ship over which he turned, and hung suspended. He suffered much from the bruise on the back of the thigh, but in a short time it got entirely well.

"Some time after this he began to be much troubled with a pain in the foot. This pain was in a part not likely to procure him much sympathy; and he suffered much and long without attempting to procure assistance, or only such as the extremity of pain will put a man upon for the time.

"But the pain continued to increase from day to day, until it totally unfitted him for labour, exhausting and wasting his frame by continued watching. This pain was of a peculiar kind; it was confined to the bottom of the foot, and was like an intense burning, while there was not the slightest discoloration or swelling in the place. Often he would rise at night from his bed and stand on the cold stones, or plunge his foot into warm water or cold water, or into both alternately.

"He now sought relief in a public hospital, and the attendants there, disconcerted with the strangeness of the symptom, which they did not comprehend, put him, as is usual on such occasions, on a course of mercury; but this trial of medicine did no good, and he went home. But, still suffering continually, he was induced, after a lapse of some months, to return to the hospital, and was again put on a more severe and a longer continued course of mercury than at first. By the time this was over he had suffered continually for two years, and was reduced to a skeleton; and he was far gone in hectic.

"When I saw him he gave me this account, and then continued to complain of the extreme pain in the sole of his foot. He told me, too, that he had a strange numbness of the leg when he sat down. On examining into this circumstance, which I thought would lead to some explanation of the more prominent symptom, I found a tumour in the ham, which, when pressed, gave no particular pain, but rather a sense of prickling numbness down the leg. The tumour was, to the feeling, of a bony hardness. I conjectured that there was some tumour pressing and wedging upon the popliteal nerve, and that this injury to the nerve in its course was referable by the patient's feelings to the extremity and final distribution of the nerve. I thought of an operation, yet I was deterred from it by the dying state of the poor man, who now suffered but indirectly from the disease of the leg, and, in all probability, death was no longer to be avoided by the removal of the original cause. I thought that he might be brought round, so as to gain some strength, but within the week he died.

"*Dissection.*—On dissecting the limb, I found a tumour under the fascia, and about three inches higher than the usual place of the popliteal aneurism. I found some nerves running over it of a remarkably pure whiteness. On tracing the sacro-sciatic nerve I found it enter into the substance of the tumour; but, on more careful observation, I observed that the peroneal or fibular nerve, though close on the tumour, was not incorporated with it; but that the tibial nerve, as is expressed in the plate, was incorporated with the tumour. On making a section of the tumour, it had much the appearance of a large ganglion on the tibial nerve; the fasciculi of the nerve could be traced only a little way into its substance; and in the interstices of the fasciculated bands a vascular fatty substance could be observed, which resembled marrow.

"I think it is impossible to mistake the nature of this case. I have no doubt that the injury received on the ham was the cause of the disease in the nerve. This, however, might be a mere coincidence. Yet I think we cannot close our eyes to the striking proof of the affection of a nerve in its course being referable to its extremity. Had the nature of this disease been understood earlier,

I have little doubt but that cutting across the portion of the popliteal nerve, which forms the tibial nerve, or the total extirpation of the tumour, would have been succeeded by the perfect relief and recovery of the patient *."

CASE XII.—This case is reported by Mr Denmark in the Medico-Chirurgical Transactions of London.

" Henry Croft a healthy young man, belonging to the 52d Regiment, was wounded on the night of the 6th April 1812, at the storming of Badajos. A musket-ball entered the triceps extensor cubiti, about one and a-half inch above the inner condyle of the os humeri, which, grazing the inner side of that bone, passed obliquely downwards through the brachialis internus, and out anteriorly, near the bend of the arm. The wound soon healed, and without manifesting any particular morbid symptom during the cure. On his admission into this hospital, I found him labouring under excessive pain, which the largest opiates could not assuage, with almost constant watching. The little sleep he had, if it could be called such, was disturbed by frightful dreams and starting. I always found him with the fore-arm bent, being unable to move it into any other position by the voluntary exertion of its own muscles. He could suffer me to extend the hand, but with increased pain. It always, however, on the removal of the extending power, fell into its former bent situation. The act of pronation he could also suffer me to perform, but in like manner with increase of pain. A small tumour could be felt in the site of the wound, on the anterior part of the arm, which he could not bear to be touched without evincing additional torture. He described the sensation of pain as beginning at the extremities of the thumb and all the fingers, except the little one, and extending up the arm to the part wounded. It was of a burning nature, he said, and so violent as to cause a continual perspiration from his face. He had an excoriation on the palm of the hand, from

* " A system of Operative Surgery, founded on the basis of Anatomy, by Charles Bell, vol. ii. p. 159. London, 1814."

which exuded an ichorous discharge. The cause of this he ascribed to a shell rolling over it. His agonies, he observed, were insufferable, depriving him of sleep, and the enjoyment of his food, for which he had sometimes an appetite. He declared himself incapable of enduring it longer without some relief, and earnestly requested the removal of the arm. Before proceeding to any operation, I recommended him to try the effects of the warm and vapour baths, anodyne embrocations, &c.; but from none of these he experienced any alleviation of his sufferings.

"The symptoms were sufficiently clear, I conceived, to lead to a correct prognosis. The part wounded, the nature of the pain, and its course from the fingers, with the exception of the little one, indicated the affection to be in the radial nerve. The increased pain attendant on the act of pronation further corroborated that supposition, from the pressure of the pronator teres upon the nerve in its passage through that muscle. The man said he had profuse bleeding after receiving the wound, yet the pulsation of the radial artery I found to be as strong as in the other arm. It was difficult to suppose the radial nerve wounded, and the humeral artery to escape; such, however, proved to be the case.

"I proposed to my patient the possibility of saving the limb, and relieving the pain, by cutting down upon the nerve, and removing a part of it, above the wound, which he willingly consented to, but observed, that he would rather have the arm amputated at once than run the risk of a second operation. In a consultation which I held with my colleagues upon this case, when we considered the chance of failure, together with the injured state of the arm, and contracted elbow-joint, we determined on the propriety of amputation. I immediately performed the operation, and with instantaneous relief to my patient. He was discharged cured in three weeks, having, in that time, rapidly recovered both his health and strength.

"On dissecting the arm, I traced the radial nerve through the wounded parts. It seemed to be blended with, and intimately attached to them, for the space of an inch. It had been wound-

ed, and at the place of the injury was thickened to twice its natural diameter, and seemed as if contracted in its length. This contraction, I thought, partly accounted for the bent position of the arm, and the increased pain on attempting its extension; but, on further examination, I was surprised to find, on dividing the fibres of the posterior part of the wounded nerve, that there was a small portion of the ball firmly imbedded in it, which had been driven off by grazing the bone. This description of injury more fully accounts for the exquisite pain felt by the patient. The os humeri was discoloured where it was grazed by the ball, and the humeral artery was uninjured. The nerve was evidently thickened, both above and below the wound. Would the division of the nerve, and cutting a piece of it out, have been attended with success *?"

Case XIII.—This case is reported by Pring.

"John Lucas, 45 years of age, was admitted into the Birmingham Hospital on account of a tumour, the situation of which corresponded with the centre of the os brachii. This tumour had been of progressive growth; it was perceived about five years previous to his admission into the Hospital, when not larger than a small horse-bean, and had increased to the size of a pigeon's egg.

"The first appearance of it had not been preceded by pain, or spasm, affecting the muscles of the arm; nor could he attribute it to a blow or other accident. From the time of its formation, an increasing numbness had been experienced in the arm and hand; and the faculties of sense and motion had suffered a very considerable impairment.

"Upon examining the tumour externally, its size could be very clearly ascertained. Pressure occasioned great pain, which extended both above and below the disease. No suspicion of the real nature of the case arose in the minds of the surgeons. The tumour was considered a deep-seated steatoma, and the phenomena of it were referred to its proximity to the course of a nerve. With this view of the matter, the only difficulty which was anti-

* Medico-Chirurgical Transactions of London, vol. iv. p. 48.

cipated in the operation, arose from the risk of wounding the brachial artery.

"The tumour was, after a little dissection, exposed, by an incision of about four inches in length: its connections above and below were ascertained, and it was found to be a disease which existed in the substance of the radial (or median) nerve. It was necessary to separate the adhesion, which the whole surface of the tumour had acquired, to the surrounding parts, with the knife; and this was cautiously and safely accomplished. A bistoury was then passed under the superior connection of the tumour, with which the nerve was divided about three-fourths of an inch above the place of its enlargement, and a similar section was repeated at about the same distance below it. The portion of the nerve which was thus cut away was about three inches in length *.

"The circumference of the tumour was the greatest in the centre; and it gradually diminished both above and below this point, until it was as it were lost in the natural size and structure of the nerve. On cutting into it, an expansion of the substance of the nerve appeared to form an imperfect cyst (for the distinction was not every where complete), in which it was contained, and the fasciculi of the filaments of the nerve were continued over it. The substance of the tumour appeared like a composition of medullary and fatty matter; and its firmness was increased by the intermixture of a cellular tissue.

"The division of the nerve was of course productive of considerable pain. The wound of the integument was closed by sticking plaster and a bandage. On the second day the arm was swelled and vesicated; the bandage was removed, and an evaporating lotion applied constantly, under which the inflammation abated. The union of the wound by the first intention did not take place; but the secondary healing processes went on favourably.

"The numbness and incapacity of the arm were much increased by the removal of this portion of the nerve; no constitutional af-

* This operation was undertaken and skilfully performed by Mr Bowyer Vaux.

fection, however, ensued, and the incision healed in less than eight weeks, at which time the man left the hospital. During the last three weeks of his abode in the hospital, the condition of the arm had undergone a visible improvement; its motions were, in a great measure, restored, and the sensibility of it was likewise considerably augmented.

"In this case, the production of such an extent of nerve could not have been accomplished in so short a time; and yet an improvement of the faculties, which we know to be dependent on the nerves, had certainly taken place. We have before examined the question of the manner in which this increase of power may be acquired, in the article on the Relations between Nerves.

"In order to complete the history of this case, I have lately written to Birmingham; and have been favoured by Mr Vaux with the additional information, that he saw his patient six months after the removal of the portion of nerve, and that the powers of the arm were then so far restored, that the man sustained little or no inconvenience in the use of it *."

Case XIV.—This case is reported by Mr Grainger.

"Mr F. Marrian, of Buck Street, in this town, whilst pruning a gooseberry tree, wounded his thumb with a thorn, on the outside of it near the nail. It inflamed, and some poultice was applied to it by direction of a surgeon who attended him. After some time the small piece of thorn was extracted, but the inflammation continued a considerable time, and at last the parts healed.

"He, however, still felt a good deal of pain in the part, and it began to extend to the first joint, afterwards to the second, and at last darting pains extended to the wrist and up the inside of the fore-arm. Various remedies were tried in vain to arrest the progress of the disease.

"He thus went on for nearly a whole year, the pain continuing, and the disease constantly extending. About the beginning

* A View of the Relations of the Nervous System in Health and in Disease, by Daniel Pring, &c. p. 152, 1815.

of the second year, a small tumour was perceived under the skin, a little above the inside of the wrist. In a few weeks, a second tumour was observed a little higher up, and in a short time afterwards three others large, and several small ones, made their appearance on the inside of the forearm, the highest being near the tendon of the biceps.

" The pains were now very great, extending up the inside of the whole arm, and darting into the shoulder, and into the muscles of the breast.

" He now consulted another gentleman, who, after trying several remedies without any effect, recommended that the thumb should be amputated. This was objected to, and again other applications were made to the parts, and amongst the rest mercurial frictions on the arm were recommended. This was persisted in for some time. Two tumours about this time appeared above the bend of the arm.

" He had thus gone on gradually getting worse for more than two years, the pains being now very severe, darting up to the shoulder and chest, shooting in radii into the pectoral muscles, and he thought into the cavity of the thorax. All the tumours were more or less painful; all were increasing rapidly, and those above the bend of the arm were become very large, and adhered to the subjacent muscles.

" He was in this situation when I was desired to see him. There was some little soreness about the thumb, which seemed to have been chiefly kept up by the nail having grown into it. This had been removed, and Mr Marrian carefully kept it from irritating the part by cutting it away when necessary.

" As all the tumours were in a state of inflammation when I first saw him, my attention was directed to allay the increased action in the parts, and that being done, the mercurial ointment was directed to be resumed, as I thought, with the gentlemen who had attended him before, that it was some disease of the absorbents.

" As this had no beneficial effect, and as the appearances and symptoms were very alarming, I determined to remove the up-

permost tumours by incision or by caustic; as the more I pondered on the case, and thought on the original injury, and the whole train of symptoms that followed it, I became the more convinced, that the disease which I had to combat had arisen from injury to a nerve; and thus, if my opinion was correct, the plan to be followed was evident. The method of treating the painful disease, Tic Douloureux, which had been recommended by that excellent anatomist and profound physiologist, Dr Haighton, was in my recollection, and although this was a very different disease, there was some analogy between them; and I felt assured, that, if my view of the complaint was correct, a favourable termination would be the result of a somewhat similar practice.

"I was induced to suppose that the disease arose from an injured nerve, first, because it was evident that it could not have arisen from a wounded tendon, as the thorn did not enter the flexor or extensor tendons; and the whole train of symptoms had no resemblance to those which arise when tendons are punctured. If the vaginal sheath of a tendon has been pierced, on inflammation coming on, the pain is excessive. The inflammation extends rapidly downwards, involving the whole thumb or finger, and extending down to the hand, if it be not stopped by cold applications, or if an incision be not made deep down through the theca, to evacuate any fluid which may be effused or formed there.

"*Secondly*, It did not appear to be a disease of the absorbents, for these reasons. I could not find that Mr Marrian had ever observed any hard or sore cord-like vessel running up the arm, nor had he perceived any in the course of these vessels. Neither of these appearances, however slightly they might have been, could have eluded his observation; but if it had been possible that either of these appearances could have occurred without his having noticed them, he must inevitably have known if any of the absorbent glands had ever been enlarged.

"There had not, however, been any swelling in these glands which are in the course of the artery, nor in the axilla. The great length of time which had elapsed from the infliction of the injury, likewise proved that the absorbents could not be the seat

of the disease; as had it been situate in that system of vessels, it must have been terminated, in some way or other, long before the period that it had occupied.

"As these reasons seemed quite decisive against the possibility of the tendons or absorbents being the seat of the disease, I concluded that it must have arisen from injury to a ramification of one of the superficial nerves. As the tumours above and below the bend of the arm were precisely in the direction of the internal cutaneous nerve, and as they were immediately between the skin and fascia, I could not doubt that that nerve was the seat of the disease.

"There certainly was an objection to this conclusion, as that nerve generally terminates about the wrist; but it is known, that the extreme branches of nerves sometimes vary in their terminations, and it was possible, that, in this case, a filament of it might have extended up the thumb.

"As this nerve arises from the great axillary plexus, its connexion with the circumflex and with the thoracic nerves, completely explained the darting lancinating pains which were felt round the shoulder and about the chest, and the anatomy of the axillary plexus tended, therefore, the more to confirm my opinion.

"If my reasoning were correct, the mode of practice which was proper to be adopted was evident. Analogy, and precedents, and reasoning, all distinctly pointed out the propriety of cutting off all connexion with the origin of the nerves; and whether this was to be done by the knife or by the caustic, was left to me to determine, for, from my patient being a man equally distinguished by firmness and intelligence, I had no wavering nor obstruction to fear from him. In fact, his suffering so long and so much from the deep lancinating pains about the shoulder and chest, superadded to what he felt in the whole arm, had excited such alarming apprehensions in his mind as to the probable result of the disease going on without controul, that he was perfectly passive; and he was willing to submit to any thing that I pro-

posed to him, if there were any probability of it putting a stop to the disease.

" Such was his bravery, that he even proposed to me to cut out all the tumours, if I thought it necessary.

" To cut out the lower tumours, or to interfere with them, or to amputate the thumb, would have been wrong, according to my idea of the disease; it would have been contrary to, and would have been impugning, the reasoning that seemed to me conclusive. It would have, indeed, been wretched practice, if my reasoning were right, as, if that were right, it was quite evident, by cutting off all communication of the disease with the parts above, that the symptoms below would cease, and that the tumours would soon be removed by the absorbents.

" I hesitated whether I should dissect the two upper tumours out, or rather a large double tumour, for it was not quite divided, or whether I should destroy it by caustic.

" If I had merely divided the trunk of the nerve, which my theory would have induced me to do, independent of some experience which I had gained on the subject before, I might thus have expected immediate cessation of all the alarming symptoms in the chest and shoulder joint; but in a case somewhat similar to this, I had not succeeded by that practice. After having divided this nerve, the pain above ceased, but a new pain arose about the back of the arm, perhaps from some branches of this nerve intermixing with others of the external cutaneous nerve or perforans Casserii, or from that nerve having partaken of the disease. In that case, after having failed in my attempt to cure by merely dividing the nerve, I dissected out the part that was painful, and even then I did not succeed till I had destroyed a considerable surface by caustic.

" For these reasons, and also as I should have had a very extensive dissection to make, I chose to rely on the caustic in the first instance, determined carefully to watch its effects, and, if I found the pains in the shoulder and chest to increase, which I feared would be the case, then to immediately divide the body of the nerve above the tumour with the knife.

"I chose to use the lunar caustic in preference to the other caustic, as all the others are so diffusible; the nitrated silver being quite manageable, and I could dissect with it, as it were, any part which I chose to remove. As soon as the integuments were penetrated, a thick, almost ligamentous, substance presented itself, very different from fascia. This was gradually destroyed. It spread very considerably, and was more than half an inch thick. Layer after layer was detached, till the muscles became denuded. Before this time all the pain had ceased above the part. Of course I had nothing to do with the muscle. The diseased portion was removed, and with it the disease disappeared.

"I cannot refrain from stating how much of the success was owing to the firmness of my patient. Not content with the slow progress of the sloughing, he forwarded it by every means in his power, and sometimes by no gentle means. We have too frequently to lament that our most matured and best plans are thwarted by the weakness of those we are attempting to serve; but I had in this case nothing to plead in excuse of failure, on that account, if I had failed; had that been the case, it must have been fairly attributed to my want of knowledge.

"Most fortunately I did succeed. The pains entirely ceased. The uneasiness in the tumours on the fore-arm gradually subsided, and, as I expected, they have all disappeared, absorption having almost removed every vestige of them; and now, February 1815, fifteen months have elapsed, and Mr Marrian remains completely well, as I have examined his arm to ascertain the state of it.

"Were such a case to occur again, I should perhaps treat it differently. I should, in the first instance, I think, divide the nerve above; and if that did not prove sufficient, I should apply the caustic on the incised part, so as to destroy a considerable surface. The parts, however, were so extensively diseased when I first saw Mr Marrian, and morbid action had been so long continued, above two years, that I believe, under similar circumstances, I should adopt a similar mode of treatment. Perhaps dissecting the upper tumour out, and applying caustic on the ex-

posed surface, might have hastened the termination of the business; but I am not quite sure of this *."

I have been favoured by my friend Mr George Bell with the following very interesting account of Neuroma seated in the ham; and to his son, Mr Benjamin Bell, I am indebted for a beautiful drawing of the preparation, of which an engraving will be found in Plate V., fig. 4.

CASE XV.—"Mr R——, a stout plethoric person, forty-eight years of age, by trade a ship-builder, has a hard and immoveable tumour, about the size of a large orange, seated in the ham of the right side. It does not pulsate, but fluctuation is felt on its inner side. States that he perceived it for the first time about fourteen years ago, since which time it has been gradually increasing: can assign no cause for its production. There is no pain in the tumour, nor in its immediate vicinity, but he endures constant and excruciating agony in the calf and leg, which is increased on pressure.

"No external application had any effect in diminishing the size of the tumour; it was therefore proposed to the patient, that it should be removed by the knife.

"The operation was commenced by making an incision from about an inch above the superior to an inch below the inferior surface of the tumour, through the teguments and fat, when, the popliteal fascia being exposed and divided on a director, a rounded mass, of a glistening leaden hue, became visible. This mass was quite smooth, and had a regular surface. It could also be moved to a slight extent, showing that its previous immobility depended upon the manner in which it had been tied down by the aponeurosis of the ham. On passing the finger between it and the bone, the artery was felt pulsating, and in close contact with

* Medical and Surgical remarks, &c. By Edward Grainger. London, 1815.

it. It seemed to be connected with the neighbouring parts, at either extremity, by a thick rounded whitish cord. This, on examination, proved to be the tibial nerve, which, after entering the superior extremity of the tumour, sent off a number of small filaments, which spread, in a fan-like manner, over its surface, and again united, to form the outer layer of that portion of the nerve which issued from the inferior portion of the tumour. From the excruciating pain which the patient felt on the tumour being touched, and from the impossibility of removing it without cutting away a large portion of the tibial nerve, it was deemed expedient, by the several medical men present, to amputate the limb.

"*Dissection of the Tumour.*—The tumour appeared to be contained within the theca of the nerve, and seemed to consist entirely of nervous matter. On cutting into it, however, there were two kinds of substance perceptible, a light and a dark coloured one. There was also, in a cavity, an ounce of a caseous matter, mixed with serum. The lining membrane of the cavity was of a glistening appearance, and was puckered into rugæ, resembling those of the bladder.

"The patient recovered well, and is, I believe, now alive."

The following case is copied from the Register of the Museum of the Royal College of Surgeons of London. The patient was under the care of Sir William Blizzard.

Case XVI.—"J. J. æt. 73. March 14. 1821. Tumour under the arm, on the inner side of the triceps. Tumour had been coming on twelve months; and he suffered considerably from darting pain in the wrist. Had tried blisters and poultices, which only increased his pain. In removing the tumour it was found under the ulnar nerve, the fibrillæ of which were separated into three distinct fasciculi, one passing over its central surface, the other two on its lateral parts, and again uniting at the inferior part of the tumour. The tumour was an indurated substance, about the

size of a nutmeg. The night previous to the operation, the patient had but little rest, and in the morning a carbuncle was observed forming on the back part of the wrist, very painful. Immediately after removal of the tumour, he complained of numbness of the ring and little finger.

" The third day after, the carbuncle became very painful; its apex presenting a circumscribed livid spot; considerable œdematous swelling of whole arm took place.

" Tenth day after the operation, the carbuncle suppurated, and presented a favourable appearance. Erysipelas appeared, but finally disappeared under the use of wine.

" Third week, great hopes were entertained of his recovery:—the discharge from the wound was very copious, and exceedingly offensive.

" Abscesses formed in the arm, which were opened. Enlargement of the glands of the neck and coldness of the extremities occurred; and the patient died on the 32d day after the operation."

The next case is taken from a Thesis published at Strasburg in 1822, entitled " Observations sur des Tumeurs developpées dans les Nerfs, par Jacques-Leon Aronssohn." I regret very much not having been successful in procuring a sight of this work. I have been favoured, however, with the following history of the case by my friend Dr Thomson, who has a very beautiful drawing of the diseased parts, in his splendid and valuable collection of pathological drawings.

Case XVII.—" Dorathée Wahl, unmarried, aged sixty-nine years, entered 3d June 1818, into the surgical ward of the Civil Hospital of Strasburg, complaining of an acute pain in the palm of the left hand. This woman was of a very robust constitution; the functions were not sensibly troubled, although almost continual pains frequently deprived her of sleep; her countenance bore the mark of pain. She could give no account of her former diseases.

" In examining the hand, I could not discover any thing differ-

ent from the natural state; but in the middle of the internal surface of the fore-arm, I perceived an immoveable tumour, very hard, indolent, of the size and form of a pigeon's egg: it formed a small projection by its elevating the skin, which was loose and healthy: it supervened many years before without manifest cause, and had increased very slowly. Notwithstanding the use of the most energetic resolvents, employed topically during four months, the tumour continued to increase, and the ardent pain in the palm of the hand became more intense, and was frequently accompanied with fever. The patient paid little attention to the tumour of the fore-arm; the fixed pain alone disturbed her: however, the part which was the seat of it presented no alteration, except that sometimes it was covered with abundant perspiration, without the rest of the body participating in it. The fingers of this hand were continually in a state of demiflexion; the appetite had diminished, and sleep was disturbed. Such was the situation of this woman when she was admitted (2d October) as pensionnaire, and had left the surgical wards. Three weeks after, she came again to implore the succour of the art for the burning pain, which, having become continual, produced the most excruciating sufferings, which she compared to burning coal placed in her hand. Considering this obstinate disease as proceeding from the pressure of the tumour on the median nerve, I undertook to extirpate it.

"I made an incision of the length of three inches and a half in the direction of the greatest diameter of the tumour. The integuments and a muscular layer being also divided, I arrived at the tumour, which had a very firm consistence. It extended so much in depth, and was fixed so firmly by the muscles and the other parts which surrounded it in every part, that it would be necessary to dissect long and painfully, in order to terminate the operation as I had at first conceived it.

"From thence I afterwards attempted to dissolve this tumour by suppuration. I made an incision four lines deep and two and a half inches long, and, after having interposed charpée between the edges of the wound, I inclosed the member in a circular bandage. The operation was exceedingly painful, especially in making the

incision through the thickness of the tumour. When exposed, it showed such a degree of sensibility, that, on touching it very lightly, the patient uttered loud cries. The substance of the tumour itself was very thick, internally it had a steatomatous aspect: the effusion of blood was very considerable, without my being able to discover an artery to tie. The operation was not followed by any accident, but the old complaints continued; and, notwithstanding all the means used to produce suppuration of the tumour, the wound, which had been made, contracted, and that of the integuments proceeded towards cicatrization. The patient, already weakened, died the 6th November (the twelfth day of the operation) of an intermittent fever, quotidian, of which the access took place at night. This fever did not yield to proper remedies applied, became continued, and was accompanied with dyspnœa. The pains of the hand had always the same intensity; the diseased member became œdematous, then the others: prostration of the strength became extreme, and death took place.

"*Anatomical examination.*—After having laid bare the tumour, I saw that it adhered to the median nerve: it was only after having cut this nerve, above and below, that it could be removed. This tumour, of a firm consistence, of an oblong form, three inches in length, occupied the middle part between the bend of the arm and the wrist; it was largest in the middle, and measured here one inch and a half. From this the tumour was of the same size, and smooth even to its superior extremity; but it became fusiform, and unequal in its inferior half.

"The place by which the nerve appeared to enter into the tumour, was not upon the same line as that by which it went out, for this last was nearer the anterior surface, and the other approached more to the posterior surface. Above the tumour the nerve was in its natural state, whilst below it was larger, and presented, in the extent of eighteen or twenty lines, an inflammatory redness.

"In the presence of M. le Professeur Lobstein, an incision was made into the middle and anterior part of the tumour, which

shewed, 1*st*, That its three superior fifths formed a circumscribed oval mass, of a firm consistence, approaching to that of scirrhus, of a yellowish-white colour, and presenting traces of fibrous structure in many places. 2*d*, That the two inferior fifths consisted of a very dense tissue, resembling the adipose cellular tissue degenerated,—a pathological production intimately connected with the former. 3*d*, The fibres of the median nerve, where it reached the superior part of the tumour, were greatly separated, some of which expanded upon the surface of the tumour, some stretched even to its inferior third, others were lost in the cellular tissue, before having gained the middle part. 4*th*, The nervous filaments, which, by their union, form the median nerve, had all been burst by the distension to which the tumour had subjected them, and the continuity of the nerve was due only to the presence of the tumour itself, which served as the means of union between the superior and inferior portion of the nerve. 5*th*, At the base of the tumour, the nerve presents a small tubercle, which appears to be the place where the rupture of the fibres took place. 6*th*, From this place the nerve enters the tumour, by means of an oval prolongation, which M. Lobstein regards as a new formation. This prolongation was twenty lines in length; it was of a very firm consistence, and presented traces of inflammation; the inferior portion of the tumour furnished to it a kind of sheath; it did not penetrate the sarcomatous portion, but passed behind, unravelling itself gradually, and losing itself in the condensed cellular tissue.

" The piece having been submitted to a slight maceration, shewed that the nerve was really burst at the base of the tumour; but that many of the filaments were continuous with other, thin, resisting, and very white filaments, which were contained in the oval prolongation which has been mentioned *."

Dr Descot in his extremely interesting work upon the local

* Observations sur des Tumeurs développées dans les Nerfs, par Jacque-Leon Aronssohn. Strasburg, 1822.

affections of nerves, in which he treats very fully of Neuroma, says :

CASE XVIII.—" M. le Professeur Richerand a déposé dans les collections de la Faculté un nerf sciatique préparé par M. H. Cloquet, qui présente un développement extraordinaire dans toute sa longeur, et des séries de renflemens ou de ganglions fusiformes. Malheureusement, M. Richerand n'a pu se procurer aucun renseignement sur le sujet dont cette pièce a été extraite, et dont tout le système nerveux présentait des tumeurs analogues." He adds,

CASE XIX.—" M. Beauchêne a présénte à la Société de l'Ecole de Médecine un kyste formé dans l'epaisseur du nerf cubital, sur un homme d'environ quarante ans."

Descot quotes also the following account of an essay of Marandel's, from the Bulletins de l'Ecole et de la Societé de Médecine de Paris.

" M. Marandel a décrit avec soin plusieurs tumeurs des nerfs, et il a réuni dans un mémoire plusieurs observations analogues aux siennes."

This essay I regret very much my not having been able to find. I have reason to suspect that it was not printed.

CASE XX.—The next case I have been kindly allowed to copy from a proof sheet of a general work upon anatomy, preparing for publication by my friend Dr Craigie, in which, when treating of the nervous tissue, he gives a very accurate account of tumours of the nerves.

" Some years ago I saw, in the arm of a woman, about thirty, years of age, an oblong pyriform hard body, extending along the inner margin of the *triceps extensor*, in the site of the brachial vessels and nerves, to the anterior tuberosity of the *humerus*. It was attended with prickling pain, and alternating with numbness of the arm, fore-arm, and fingers. From these symptoms, the absence of pulsation, and its situation, no doubt could be entertained that it impli-

cated the brachial nerve. The woman refused, however, to submit to have it removed, and I have not since heard of her. The evidence of dissection as to its precise nature is therefore still wanting."

Since writing the greater part of this communication, I have been favoured by Mr Syme, Fellow of the Royal College of Surgeons, with an opportunity of seeing the disease in a patient under his care, from whom he removed the tumour with complete success. He has obligingly drawn up for me the following accurate account of the history of the disease, and of the appearance of the tumour.

CASE XXI.—"James Muir, aged 43.—*30th June* 1828.—On the inner side of the left knee, about a hand-breadth above the joint, there is a narrow depressed cicatrix, two inches long. Between this cicatrix and the sartorius, there is a small tumour, about the size of an almond, and of very firm consistence. When the limb is extended, this tumour can hardly be perceived, being then overlapped by the sartorius; but when the knee is bent, it can be felt very distinctly. It is most moveable in a lateral direction; but seems pretty firmly connected to the subjacent parts, by condensed cellular substance.

"The patient states that the tumour is always painful when pressed, but is more so at one time than another. The pain is not confined to the part, but shoots all over the knee, and sometimes extends from the groin to the toes. He observes that the pain is most severe during cold and damp weather. It frequently, for days together, prevents him from walking, or even resting on the limb. His story is, that, when a boy, about eleven years old, he strained his knee, by jumping into a saw-pit, which led to the formation of a large abscess that opened on both sides of the knee, viz. at the part where the cicatrix above mentioned still remains, and exactly opposite, where also there is a similar cicatrix. Several small bits of bone were discharged; and, at the end of two years, he got quite well. For the following twenty-seven years, he led an active life; ten of them were spent in a militia regiment. About eight years ago, he strained his knee while walking in his garden;

and thereafter became subject to flying pains about the joint. These pains induced him to rub the knee frequently; and, in doing so, about two years ago, he noticed the tumour. It was then the size of a pea, and has gradually enlarged. The disagreeable symptoms also, have become greatly aggravated; and as he refers them all to the tumour, he is desirous of having it removed.

" 12*th July*.—Mr Wood, who was kind enough to examine the patient, having agreed with me that the tumour was seated on or in the nervus saphenus, and that it ought to be removed, I performed the little operation, with his assistance, on the 1st of July.

" The tumour being divided shewed a firm fibrous capsule, containing a soft brownish-white pulpy matter. The nerve was traced into the tumour, but not through it. The patient made a good recovery, and remains free from his complaint."

In the following case, the disease occurred in the internal parts of the body, where it has not yet been frequently met with. The dissection affords a very satisfactory explanation of the singularly severe and anomalous pains of which the unfortunate patient complained.

Case XXII.—" Clotilde Frison, âgée de quarante-neuf ans, avait toujours joui d'une bonne santé, lorsqu'elle commença à ressentir, dans le commencement de 1820, des douleurs vives dans *le corps* (expression dont elle se servait). Elles semblaient naître dans la partie gauche de la poitrine, et la malade les rapportait à une petite tumeur squirreuse, développée dans l'épaisseur de la mamelle de ce côté, et qui n'était nullement douloureuse à la pression. Ces douleurs profondes et générales augmentaient chaque jour; ne pouvant les calmer, elle chercha à s'étourdir en s'enivrant assez fréquemment. Ce moyen ne produisit pas l'effet qu'elle en attendait; les souffrances devenaient de plus en plus intolérables, et cependant la tumeur de la mamelle n'acquérait pas plus de volume et ne devenait pas plus sensible. Elle entretenait sans

cesse les personnes qui la connaissaient du mal qui la tourmentait nuit et jour. Elle avait maigri considérablement: dans cette situation pénible la vie lui devint à charge, plusieurs fois elle tenta de se détruire, et l'on avait déjoué chaque fois ses projets, lorsque le 5 Novembre 1822 elle se précipita par la fenêtre de sa chambre, qui se trouvait à un quatrième étage.

" Dans le haut de la cavité de la poitrine du côté gauche au-dessus de la crosse de l'aorte, il existait une tumeur pyriforme, de la grosseur d'un œuf de poule environ, recouverte par la plèvre, à laquelle elle adhérait d'un côté par une légère couche de tissu cellulaire, et de l'autre, à la partie latérale gauche du corps de la vertèbre indiquée. La base de la tumeur répondait à la courbure aortique; son sommet tenait à un cordon blanchâtre, resistant, ayant la grosseur d'un tuyau de plume, et qui sortait du trou de conjugaison situé entre la première et la deuxième vertèbre dorsales.

" En examinant la moelle épinière, on vit manifestement les filets des racines antérieure et postérieure de la première paire, qui se dirigeaient comme de coutume vers le trou de conjugaison, pour former la première paire dorsale; celle-ci, après être sortie de ce trou, fournissait, comme à l'ordinaire, une branche postérieure. La branche antérieure, après avoir communiqué avec le grand-sympathique, et donné naissance à un rameau ascendant qui passait au devant du col de la première côte pour s'unir au septième nerf cervical; cette branche, dis-je, augmentait subitement de volume, et après un pouce de trajet depuis le point de départ du rameau ascendant qu'on vient d'indiquer, elle venait se terminer, en se courbant un peu en avant, au sommet de la tumeur désignée; cette branche, de la grosseur d'une tuyau de plume, n'avait pas changé de couleur; son névrilème était épais, il se continuait, et se réfléchissait sur la tumeur, et se confondait avec son enveloppe.

" La tumeur était d'une couleur blanchâtre, un peu rosée à l'extérieur: elle était élastique, de sorte que, comprimée entre les doigts, elle reprenait ensuite sa première forme; son sommet etait dirigé en haut et en dedans, sa base en bas et en dehors. Sa

face antérieure était un peu arrondie ; sa face postérieure, légèrement déprimée, présentait en arrière trois plaques cartilagineuses, de quatre à cinq lignes de diamètre. Plus haut, on voyait un certain nombre de granulations de même nature que les plaques, et qui adhéraient de même à la membrane d'enveloppe. On coupa le nerf qui servait de pédicule à la tumeur, suivant sa longueur, et l'on reconnut évidemment que son névrilème épaissi se continuait immediatement avec la membrane extérieure de la tumeur; il n'y avait aucune trace d'adhérence entre ces deux parties. Il semblait que le névrilème lui-même se fût dilaté pour recouvrir la tumeur.

" Les fibrilles nerveuses, d'abord longitudinales et isolées, formaient ensuite trois faisceaux distincts, dont un plus gros se dirigeait obliquement en arrière, et s'epanouissait bientôt dans le tissu même de la tumeur, avec lequel il se confondait de telle sorte qu'il n'était plus possible de l'en distinguer. Les deux autres se portaient en avant, à droit et à gauche, et offraient absolument la même disposition.

" La tumeur, incisée longitudinalement, offrit une surface pulpeuse, d'un blanc nacré, douce au toucher, paraissant formée de fibres concentriques, assez analogues pour leur disposition aux fibres ligamenteuses de la symphise du pubis : la couleur blanche était uniforme et nullement nuancée. La coupe n'était pas nette comme celle que présente la substance cérébrale, mais cependant elle n'était pas inégale ; on ne distinguait aucune vaisseau dans son intérieur, qui était plein partout et homogène : elle se ramollit un peu à l'air, et la surface de la section perdit de son poli ; extérieurement, elle adhérait fortement à la membrane d'enveloppe.

" D'après la description qu'on vient de lire, il est évident que la nature de la tumeur était la même que celle du squirre non ramolli. Il existe un grand nombre d'observations de tumeurs semblables développées dans la continuité des nerfs des membres· mais aucun auteur n'a cité d'altération de cette espèce, occupant ainsi la terminaison d'un nerf. Ordinairement, le tissu squirreux de ces tumeurs est parsemé de vésicules ou de petits kystes, renfermant le

liquide d'apparence sirupeuse qui appartient au squirre ramolli. Ici, ce tissu n'offrait qu'un même aspect, et l'on ne pouvait y découvrir les nerfs qui le pénétraient, ce qui prouvait que leur altération était de la même nature que celle de la tumeur. Enfin, on ne peut meconnaitre, je crois, la cause de ces douleurs sourdes et profondes que la malade disait ressentir *dans le corps*: elles étaient évidemment produites par la malade locale dont il est ici question. Cette derniére circonstance n'est pas moins digne de remarque, que les autres détails présentés dans cette observation *."

The next case is taken from the Register of the Pathological Collection belonging to the University of Wurtzburg, in which the preparation is preserved.

CASE XXIII.—" A man, æt. 39, was affected with subcutaneous steatomatous swellings over his whole body;—a disease which he appeared to have inherited from his father. He had otherwise been in good health till two or three months before his death, when he complained of feeling rheumatic pains over the whole body; and soon afterwards violent pains in the head, which came in nocturnal fits, with vomiting, grinding of teeth, and double sight. These increased in frequency and violence, and the limbs became affected with numbness, and he died.

The whole left side of the brain was displaced by an enormous swelling of the left *crus cerebelli ad pontem Varolii*. The brain was otherwise healthy; there was some serum in the third ventricle. A tumour of the size of a pea was found behind the left fifth nerve, and similar tumours on different parts of the spinal cord, connected with it by cellular texture.

All the nerves of the body were three or four times thicker than natural, and covered with gangliform swellings. The nerves of the upper and lower extremities, the plexus brachialis, and sacralis, as they proceed from the vertebral foramina, were changed

* De la Moelle Epinière et de ses Maladies, par C. P. Ollivier, d'Angers. A Paris 1824.

into thick nodose strings; one of the ischiatic nerves was 1½ inch in diameter.

The preparation shews, on the one side, the brachial plexus, and on the other the *sympathetic* nerve, both diseased.

CASE XXIV.—William Miller, ætat. 39, labourer, was admitted into the Royal Infirmary of Edinburgh on April 1. 1814, and was under the care of my friend Mr George Bell. The history of the case is taken from the register of that institution. "In the triangular space, formed by the sterno-mastoid and trapezius muscles, and the clavicle, of the right side, there is a hard lobulated, prominent tumour, which dips beneath the margin of the former muscle; the trachea is pushed to the opposite side. There is a frequent lancinating pain, hoarseness, and a troublesome cough in the morning, attended with expectoration. Speech, deglutition, and respiration, are greatly affected and impeded. Pulse 96, and equal in both arms. Frequent rigours. The right side of the face, and the corresponding arm, are at times œdematous, and the head is turned down upon the right shoulder. This affection began some time ago, and is becoming gradually larger." Leeches were repeatedly applied, and different remedies, both general and local, were had recourse to without relief. The patient died suddenly of suffocation fourteen days after his admission into the hospital. The œdema of the right arm increased prodigiously, and all the other symptoms were much aggravated before death.

I have been favoured, by my friend Professor Turner, with the following very accurate and interesting description of the diseased parts, which were carefully prepared by him, and are preserved in the Museum of the Royal College of Surgeons.

"The tumour on the right side of the neck is six inches long and three broad; it extends from the base of the cranium to the lower part of the neck, and lies along the course of the large vessels, under the sterno-mastoid and omo-hyoid muscles. When cut through, it is found to consist of a firm, uniform substance, of a light-brown colour, and opaque. The texture is of a fibrous appearance, and is somewhat flexible, and tough, excepting at one

EXPLANATION OF PLATE V.

FIG. 1. The size and form of the tubercle removed from the leg of the patient, whose case is detailed in p. 332. of the communication on Painful Subcutaneous Tubercle.

2. The size and form of the tubercle, as it exists in the foot of the patient, whose case is detailed in p. 335. of the same communication.

3. Tubercles formed at the extremities of nerves cut in the operation of amputation. Vide p. 381. of the communication on Neuroma.

4. The nervous tumour taken, after amputation, from the ham of the patient whose case is detailed in p. 422. of the same communication. 419

A A, The Tibial Nerve.

B, The Fibular Nerve.

C, The Popliteal Artery.

D, The Cavity of the Tumour lined by a secreting membrane.

E E, The enormously thickened parietes of the tumour.

F, The fan-like expansion of the Tibial Nerve over the surface of the tumour.

ON THE

SPECIFIC GRAVITY

OF

DIFFERENT PARTS OF THE HUMAN BODY.

By JOHN DAVY, M. D. F.R.S. Physician to the Forces, Corresponding Member of the Medico-Chirurgical Society of Edinburgh.

IT having appeared to me, that this subject is deserving of investigation, I have instituted a set of experiments on it, the results of which I beg leave to present to the Medico-Chirurgical Society of Edinburgh.

The parts submitted to these experiments were weighed almost immediately after they were taken from the body, in every instance in less than six hours, and generally within two. They were carefully dissected out (when dissection was necessary), and freed as much as possible from contiguous and adhering textures, which might vitiate the results, and especially from fat. They were not washed with water; they were deprived of any superfluous fluid adhering to them, by being gently pressed between folds of blotting paper. The Ro-

man numeral figure is used to indicate the body from which the parts were taken, and to which afterwards some reference will be made.

No.		Spec. grav.
1.	xi. Nail of thumb, dissected off entire, -	1.197
2.	ii. Cuticle of sole of foot, - -	1.190
3.	... Do. with adhering cutis, - -	1.180
4.	xi. Skin of back of thumb, free from fat, with cuticle undetached, - - -	1.100
5.	iii. Skin of chest, over the pectoral muscle,	1.108
6.	... Do. with a thin layer of adhering fat, -	1.050
7.	iv. Skin of epigastric portion of abdomen, -	1.103
8.	... A front tooth of a young man, not decayed, extracted because loose, owing to disease of the gum, - - - -	2.240
9.	... Root of the same, the air which was in its cavity expelled, - - - -	1.950
10.	... Crown of the same, - - -	2.380
11.	... First molar tooth of a man, about forty years old, extracted on account of pain, connected with a slight caries, - - -	2.142
12.	... Roots of the same, - - -	2.113
13.	... The whole of the upper part of the same, above the gum, - - - -	2.313
14.	... The top of the crown of the same, consisting chiefly of enamel, - - -	2.620
15.	... A molar tooth not complete, the roots not formed, from the skull of a young woman of Ipsara, which had been exposed about two years to the open air, - - - -	2.500
16.	... A portion of parietal bone from the same skull,	1.944
17.	ix. A portion of pars petrosa of temporal bone,	1.852
18.	iv. Parietal bone freed from pericranium, -	1.772
19.	... Eighth rib freed from periosteum, c	1.383

No.			Spec. grav.
20.	iv.	Fat from beneath the integuments of abdomen *,	0.942
21.	....	Dura mater, - - - -	1.090
22.	v.	Tunica albuginea testis, - -	1.088
23.	xii.	Sclerotic coat of eye, - - -	1.091
24.	....	Cornea, - - - -	1.076
25.	....	Lens, - - - -	1.100
26.	v.	Ligamentous sheath of corpora cavernosa penis,	1.097
27.	ix.	Aponeurosis covering vastus externus muscle,	1.080
28.	vi.	Anterior portion of last lumbar intervertebral substance, - - - -	1.092
29.	xii.	Anterior and outer portion of intervertebral substance, from the lumbar part of spine,	1.104
30.	....	Upper portion of the same, containing some of the articulating cartilage, - -	1·110
31.	....	The portion beneath, free from articulating cartilage, - - - -	1.098
32.	....	Central parts of the same, soft and pulpy,	1.062
33.	x.	Tendo Achillis, - - -	1.080
34.	vi.	Ligament of patella, - - -	1.104
		Cartilage of knee-joint, - -	1.073
36.	iii.	Pericardium, - - -	1.014
37.	v.	Cellular part of corpora cavernosa penis,	1.086
38.	iv.	Thoracic aorta, - - -	1.086
39.	vi.	Arch of aorta, - - -	1.080
40.	....	Upper part of femoral artery, - -	1.071
41.	....	Middle part of the same, - -	1.061
42.	....	Upper part of the internal iliac artery, -	1.060
43.	vii.	Half of a portion of aorta, just below its arch, divided longitudinally, - -	1.086
44.	....	Other half of the same, its outer fibrous coat detached, - - - -	1.077
45.	....	Lower part of aorta, just before its termination,	1.074

* Its specific gravity was ascertained, indirectly, by means of that of a mixture of alcohol and water, in which, when submersed, it remained stationary.

No.			Spec. grav.
46.	vii.	Internal iliac artery, - - -	1.068
47.	v.	Abdominal vena cava, - -	1.061
48.	xiii.	Vena cava, close to the emulgent vein, -	1.061
49.	....	Emulgent vein, - -	1.061
50.	....	Upper part of femoral vein, - -	1.066
51.	....	Contiguous vena saphena major, -	1.071
52.	vi.	Two of the largest nerves of the femoral fasciculus in the groin, - - -	1.111
53.	iii.	A portion of cerebrum (medullary and cortical substance intermixed), - -	1.040
54.	....	A portion of cerebellum, - -	1.043
55.	iv.	Pons varolii, - - - -	1.033
56.	....	Medulla oblongata, - - -	1.037
57.	i.	Upper part of spinal cord, - -	1.035
58.	v.	Substance of testicle, - - -	1.041
59.	iii.	Substance of liver, - - -	1.053
60.	iv.	Ditto, - - - -	1.035
61.	i.	Ditto, - - - -	1.069
62.	v.	Ditto, (Lobulus Spigelii), - -	1.066
63.	vi.	Ditto, - - - - -	1.050
64.	vii.	Ditto, (Lobulus Spigelii), - -	1.059
65.	viii.	Ditto, - - - -	1.042
66.	ix.	Ditto, - - - -	1.045
67.	iii.	Substance of spleen, - - -	1.044
68.	iv.	Ditto, - - - -	1.064
69.	v.	Ditto, - - - -	1.070
70.	vi.	Ditto, - - - -	1.048
71.	vii.	Ditto, - - - -	1.058
72.	viii.	Ditto, - - - -	1.061
73.	ix.	Ditto, - - - -	1.060
74.	iii.	Substance of pancreas, - -	1.047
75.	v.	Substance of kidney, - - -	1.050
76.	vi.	Ditto, - - - -	1.050
77.	viii.	Supra-renal gland, - - -	1.048

No.			Spec. grav.
78.	viii.	Thyroid gland, - - -	1.060
79.	v.	Concretion of fibrine from ventricle of heart,	1.057
80.	xiv.	Substance of lung, - - -	1.054
81.	iii.	Hepatized lung, - - -	1.043
82.	vi.	Enlarged lymphatic gland, contiguous to the lower part of abdominal aorta, -	1.046
83.	iv.	Muscular substance of left ventrical of heart,	1.049
84.	....	Great pectoral muscle, - -	1.058
85.	vii.	Sartorius muscle, - - -	1.056
86.	xi.	Lower part of œsophagus, - -	1.040
87.	....	Cardiac portion of stomach, - -	1.048
88.	....	Pyloric portion, - - -	1.052
89.	....	Upper part of duodenum, - -	1.047
90.	....	Upper part of jejunum, - -	1.042
91.	....	Lower part of ilium, - - -	1.041
92.	iv.	Middle part of ilium, - - -	1.044
93.	xi.	Sigmoid flexure of colon, - -	1.042
94.	....	Hair, - - - -	1.280
95.	....	Ditto, - - - -	1.293
96.	....	Ditto, - - - -	1.278
97.	....	Ditto, - - - -	1.290
98.	....	Ditto, - - - -	1.275
99.	....	Ditto, - - - -	1.345
100.	....	Ditto, - - - -	1.323
101.	....	Ditto, - - - -	1.300

I shall now give some brief notices of the fatal cases, which supplied the objects of the preceding experiments, premising generally, that they were all soldiers, and natives of either England, Scotland, or Ireland.

i.—Aged twenty-seven years; was admitted into hospital on 29th August; and died 11th Septem-

ber of peritonitis, occasioned by perforation of the ilium, the effect of chronic ulceration. The liver and upper part of spinal cord appeared to be quite sound. The dissection was commenced eight hours after death.

ii.—Aged thirty-nine years; was admitted into hospital 29th October; died 31st October, of remittent fever, complicated with bronchitis. Dissection eighteen hours after death.

iii.—Aged twenty-eight years; was admitted into hospital 16th July; died 9th of September, of pneumonia. There was much fluid in the ventricles, and between the membranes of the brain; the substance of the brain appeared to be sound. The lungs were variously diseased; hepatized in part, in part dropsical and tubercular. The liver exhibited slightly the nutmeg-like section. The spleen was not enlarged, but rather of a brighter red and harder than natural. Dissection seven hours after death.

iv.—Aged thirty-four years; was admitted into hospital 9th of September; died 10th September, of (as it was supposed) remittent fever. Blood was found extravasated in the surface of the cerebrum; the trachea and bronchia were redder than natural; the œsophagus was dark red. The liver was of the colour nearly of yellow wax; the spleen firmer than natural. Dissection sixteen hours after death.

v.—Aged twenty-six years; was admitted into hospital 20th September; died 27th September, of (as it was supposed) remittent fever. The trachea

and bronchia were very red; the œsophagus was highly inflamed. The bile in the gall-bladder was black and offensive to the smell; the gall-bladder itself was in a state of incipient gangrene. The common gall-duct was pervious; the liver and spleen were apparently sound. Dissection nineteen hours after death.

vi.—Aged twenty-two years; was in hospital 116 days; died 2d October of chronic dysentery, complicated with tubercular phthisis. The liver was very voluminous, and rather paler and firmer than natural. The spleen was large and firm. Dissection nine hours after death.

vii.—Aged twenty years; was admitted into hospital 30th September; died 5th October of remittent fever. No organ but the spleen was particularly diseased. The spleen was of great bulk, of very soft consistence, like the stale crassamentum of blood; and after three or four hours' exposure to the air, it became putrid. From some experiments which I made on it, it appeared to contain a large proportion of coagulable lymph effused into it, and a very small proportion of the red particles of the blood. This state of spleen, I may remark, almost always presents itself in the fatal cases of remittent fever in the Ionian Islands. The liver was voluminous, soft, and of a brownish grey colour. Dissection twelve hours after death.

viii.—Aged twenty-five years; was admitted into hospital 18th November; died 23d November of (as it was supposed) remittent fever. The lungs,

bronchia, trachea, œsophagus, and colon, were more or less inflamed; the mucous coat of colon was in places gangrenous. The liver was rather softer than natural; the spleen was apparently sound. Dissection twenty-four hours after death.

ix.—Aged forty-one years; was admitted into hospital 26th November; died 27th November of inflammation of the bronchia and trachea, supervening a latent tubercular phthisis. The spleen was of natural appearance; the liver exhibited the nutmeg-like section. Dissection eighteen hours after death.

x.—Aged twenty-eight years; was admitted into hospital 29th September; died 22d October, of chronic dysentery, after remittent fever. Dissection nine hours after death.

xi.—Aged thirty-nine years; was admitted into hospital 5th September; died 13th November, of latent tubercular phthisis, and other organic disease, after an attack of remittent fever. The œsophagus was redder than natural, and its epithelium in great part abraded. The jejunum and ilium were rather redder than natural, and the inferior part of the latter was slightly ulcerated. The large intestine generally, with the exception of its sigmoid flexure, was severely ulcerated. The spleen was rather smaller and firmer than natural; the liver presented the nutmeg-like section. Dissection seven hours after death.

xii.—Aged twenty-three years; was admitted into hospital 29th August; died 8th December, of tubercular phthisis. The body was extremely ema-

ciated; the lens was unusually soft, and the intervertebral substance perhaps softer than natural. Dissection twenty-nine hours after death.

xiii.—Aged twenty-seven years; was admitted into hospital 11th December, died 21st December, of peritonitis, the consequence of perforation of the ilium, the effect of ulceration. Dissection thirty-one hours after death.

xiv.—Aged twenty-nine years; admitted into hospital 18th January; died 7th February, of inflammation of both pleurae. A collection of pus was found in the anterior mediastinum; about three-fourths of a gallon of serum in the left pleura, and about one-fourth of a gallon in the right. A good deal of coagulable lymph was effused in each cavity, both loose and adhering. The lungs were very little diseased; the inferior lobe of the left lung which afforded the specimen, No. 80., the specific gravity of which has been given, was compressed by the effused fluid in a very remarkable manner, and was entirely destitute of air. It bore no marks of inflammation or of hepatization; and in sulphurous acid, it expanded like the substance of the corpus cavernosum penis *.

* Even when immersed in distilled water deprived of air, and placed under the exhausted receiver of the air-pump, it gave off only a few adhering air-bubbles. It would be difficult to explain this by the mere pressure of the effused fluid. Such a complete absence of air was probably owing to pressure and absorption acting together; and, in confirmation of this opinion, I

To these brief notices of fatal cases, it may not be amiss to add some particulars relative to the different specimens of hair of which the specific gravities are given. The first three specimens of hair belonged to English women of the same family, between the ages of thirty and forty years; two were light brown; one was dark brown; all three were fine. The hair No. 96. belonged to a woman of Corfu, aged sixty-six years; it was grey, and very fine. No. 97. belonged to a man of the same island, aged seventy-seven years; it was white, and very fine and soft. No. 98. belonged to an Ipsariot, and was taken from his body, which, when I visited Ipsena, was, with many others, lying in the battery called Fetellio, where they had fallen, making a brave but vain defence against the Turks, who, in a few hours, converted this before flourishing island into a desert. Though more than two years had elapsed, these bodies were but little changed; their features, black indeed, and shrunk, were distinct, each person might be known by them; and their clothes (for they had not been stripped), had experienced little decay *. The hair was considerably

may mention, that I have found only a very small quantity of air in the lungs of animals which have been killed by strangulation, by the ligature of the trachea.

* The situation of this place was dry, and its aspect northerly. In the castle of Ipsena, on the contrary, which has a southerly aspect, nothing but whitened bones remained of the numerous victims of despair who blew themselves up, by exploding the magazine when the place was taken. These facts strongly exemplify the difference of character of the very dry Etesian or northerly wind, and the very humid Sirocco or southerly.

bleached; and probably in consequence of the destruction of its oleaginous part, its specific gravity was so high. It is worthy of remark, that the effect of the sun's action on the human hair is quite different from its effect on the skin; for whilst it darkens the latter, it renders the former brighter. Every observant traveller must have witnessed instances in illustration of this remark. The most striking example of the kind that I recollect, is afforded by the female inhabitants of the border town of Itri, on the confines of the Neapolitan and Roman states, where the women are in the habit of exposing themselves, their heads uncovered, in the open air; and, in consequence, there is a striking contrast between the dark sunburnt countenances, and their comparatively light hair, which, variously discoloured by the action of the sun's rays, and generally much neglected, imparts to them an air of extreme wildness. The hair No. 99. belonged to a Hottentot woman, a native of Cape Town, about twenty years old; it was black, coarse, woolly, and almost felted together, admirably adapted for protection against the sun; but it had not been exposed to its action *. No. 100. belonged to a young woman of Pitcairn's Island, in the Pacific Ocean, a daughter of Adam, one of the mutineers of the Bounty, of whose patriarchal family such an inte-

* The effect of the sun's rays on the hair of the Negro, is, I believe, analogous to that on the European, &c., but less powerful: I say, *believe*, because I am not quite certain of it.

resting account has lately been published. This hair is reddish-brown, partially discoloured by the action of the sun's rays; it is rather coarse, but not in the slightest degree woolly.

On the results generally, I shall confine myself to a very few observations before I conclude. I indulge in the hope, that the physiologist will receive them as a contribution to his science, considered as a collection of facts and of rules deduced from facts, independent of speculation; and that the pathologist, by prosecuting its investigation farther, may derive from it a help to the eye, and a more certain criterion of organic change, than we yet possess in his important but obscure branch of medical knowledge. The quality of specific gravity will probably be most applicable, as a characteristic to the viscera, especially the liver and the spleen; and perhaps the brain, lungs, and kidneys. The results I have given of my experiments on the two first mentioned viscera, are favourable to this conjecture. These results are very various, and almost convince me, that organic disease of the viscera cannot take place without altering their specific gravity; and if so, it is not improbable that this precise quality may be made an index of the kind and degree of organic change; and *a priori*, perhaps, thus much might be inferred; for if fatty matter is deposited, the specific gravity must be diminished, if cartilaginous matter, it is probable it will be increased; and that it will be variously diminished or increased, according to the kind of deposition. Moreover, attention

to these changes may lead to more minute observation, and to the collecting of information curious and useful. Every new means of research is thus indirectly useful; whoever employs the stethoscope of Laennec, though he may not appreciate its merits in the same high degree as that ingenuous and profound physician, cannot fail of deriving instruction from its use, and becoming better, more minutely, more discriminatively, acquainted with the diseases of the chest. The same may be said of Avenbrugger's method of diagnosis by percussion, and indeed of every other method of investigation, which directs and fixes the attention, abstracting it from vague and unmeaning generalities, to precise and significant particulars, whether we have in view, during life, the symptoms of disease by the bed-side of the patient; or, after death, on the dissecting table, the organic changes, the effects of diseased action.

CORFU,
January 2. 1828.

ON THE EFFECT OF

REMOVING ATMOSPHERIC PRESSURE

FROM THE

FLUIDS AND SOLIDS OF THE HUMAN BODY.

By JOHN DAVY, M. D. F. R. S. Physician to the Forces, Corresponding Member.

IN trying the effect of removing atmospheric pressure from the animal fluids and solids, by means of the air-pump, it is particularly necessary that many precautions be taken to insure the obtaining of accurate results. It may not be amiss to specify those which are most essential; and, *first*, in relation to the fluids.

1*st*, In collecting them, or in transferring them, the entanglement of atmospheric air, or frothing, is most carefully to be avoided.

2*dly*, The vessels to be used in the experiments should be scrupulously clean; and, just before they are used, they should be wetted inside, or rinsed out with distilled water, from which the air had

been previously exhausted, that as little air as possible may adhere to their side.

3dly, Great care should be taken that no dust, or particles of foreign matter, fall into the fluid or vessel, as all minute particles, so circumstanced, afford air, when the atmospheric pressure is removed, and may occasion deception.

Lastly, Great attention should be paid to the temperature of the fluid, that it is below that degree at which it boils *in vacuo*. Neglect of this circumstance, I believe, has given rise to many and serious mistakes.

In relation to the solids, the following precautions are deserving of attention:

The instant the part to be tried is exposed to the atmosphere, a convenient portion of it should be cut out, with a very sharp scalpel, with as little rending or pulling as possible; and, without delay, it should be immersed in distilled water, deprived of air by previous exhaustion. If it be possible, the vessels which supply the part should be secured by ligature before it is removed.

Having premised thus much, I shall now relate the result of the experiments which I have instituted, with the desire of solving some of the important problems which are involved in this inquiry.

On venous blood, I have made very many experiments with great care, and the result has always

been negative, equally so, whether the blood was liquid or coagulated; and, I may add, that I have obtained the same result, using the mixed arterial and venous blood of the sheep and lamb, of the rabbit and pigeon.

On milk I have made fewer experiments. The result of them, too, was negative, both when using human and cow's milk fresh, though not so absolutely negative as in the trials with blood; for a very few bubbles of air were disengaged, but no more than there is a right to suppose were entangled in the fluid, as it was expressed from the nipple into the receiving vessel. And, I may here mention, that the result of my experiments on the new laid egg of the common fowl has been similar; neither the white of it, or its yolk, afforded any air *in vacuo**.

I have also made trial of bile and synovia: of the fluid of the ventricles of the brain, of the pericardium, and of the vitreous and aqueous humours

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* When the whole egg was immersed in distilled water, then, indeed, it gave off some air *in vacuo*; adhering bubbles were detached from the outer surface of the shell generally, and a current of bubbles for several minutes, was poured out from two or three conspicuous pores in the large end of the egg,—air, I believe, which had entered through the same pores during the cooling of the egg, and its consequent contraction,—which I infer from not finding any air in this part of the egg when it has been put into water the instant it has been laid, and examined under water.

of the eye; and I have not been able to obtain air from any of them. With the humours of the eye I have made only one experiment; on each of the other fluids I have made two. I shall notice the bodies from which they were obtained, in describing my experiments on the solid parts.

On the urine I have made many experiments, collected in hospital, from different persons in health and in disease, and at different parts of the day, as, on rising in the morning; after breakfast; after several hours fasting and exercise; and after dinner, and with the same negative result; and also with the same negative result, when it has been secreted copiously, after drinking a large draught of water containing common air, or of water abounding in carbonic acid gas.

I have availed myself of two fatal cases to try the effect of a vacuum on some of the principal solid parts of the body.

The first was that of a man, aged 28 years, who was admitted into hospital on the 11th October, and who died, on the 29th January, of chronic dysentery, complicated with organic disease of the liver and spleen. The post-mortem examination was made thirteen hours after death. The large intestines were found severely ulcerated; the lower part of the ilium slightly. The liver weighed 6½ lb.; the spleen 1¾ lb. The tibiæ were much augmented in volume, especially their outer face, by a deposi-

tion of bony matter. The individual had experienced successive attacks of remittent fever, chronic hepatitis, chronic rheumatism, ascites and dysentery. In this instance, besides the fluids already mentioned, including the aqueous and vitreous humours of the eye, portions of the following parts were subjected to experiment, viz. the brain (its central substance), the liver, spleen, pancreas, kidney, aorta, skin and tibia. With the exception of the portion of cerebrum, they all gave off air; the portion of aorta and kidney in very small quantity, the other parts in abundance; even the portion of bone, deprived of its periosteum, though it was apparently dense, and was found to be of specific gravity 1.78.

The second fatal case was that of a man aged 33 years, who was admitted into hospital on the 26th November, and who died on the 1st February, of chronic dysentery. The body was examined twenty hours after death. The large intestines exhibited the worst effects of the disease; the lower part of the ilium was slightly ulcerated; the other organs were apparently sound. The parts subjected to trial were a portion of the central part of the brain, of the liver, spleen, testicles, and pectoralis major. All these parts gave off air, with the exception of the brain, and all of them a good deal, with the exception of the spleen; which was small and firm, and afforded so little air, that it might perhaps be considered merely adhering air.

These results required farther investigation. I have made similar trials on some of the solids of a lamb, very soon after it was killed, in the ordinary manner, by the division of the great bloodvessels of the neck, and before the peristaltic motion of the intestines had entirely ceased. On exposing the heart, there was evidently some air in its cavities, and also in the venæ cavæ and aorta. A portion of the left ventricle, immersed in water, deprived of air under the exhausted receiver, gave off a great deal of air, and exhibited a very striking and curious appearance, from the manner in which the very minute ramifications and anastomosing branches of the coronary vessels were injected and distended with air, and from a kind of pulsation of the larger branches, as the air-bubbles passed through them and escaped. A portion of the muscular part of the diaphragm, of the substance of the liver, in which there was no large vessel, and of the small intestines, which were empty and collapsed, gave off each only a very few air-bubbles, no more than might, with propriety, be considered as adhering, acquired in the operation of transferring the parts from the body to the fluid in which they were plunged. A portion of kidney and of spleen, not carefully cut out, gave off pretty much air; when carefully cut out, the quantity of air was decidedly less.

With a desire of obtaining farther and more satisfactory information on this subject, I have had

two rabbits of the same age killed; one, by dividing the great cervical bloodvessels; the other, by a blow on the occiput. The thorax of each was opened before they were cold. In the heart of the first mentioned there was evidently air, and even in the coronary vessels. In the heart of the second there was no appearance of air; it was moderately distended with blood, and its vessels were full of blood. A ligature was applied to the great vessels of each, and the hearts were removed, and put into water. The first swam; the second sunk. Under an exhausted receiver, the first was amazingly distended, —its bloodvessels also were distended, and their very minute ramifications were beautifully displayed, variously anastomosing: very little of the air was disengaged. The second was not at all distended; a few bubbles were given off, chiefly from the ends of the cut vessels. The coronary vessels did not exhibit the slightest change; and not the minutest air-bubbles could be discovered in them. A large portion of the liver of the first was cut off, including the gall-bladder, full of a green transparent bile. In water, under the exhausted receiver, it gave off a good deal of air; and, for a considerable time, the air came entirely from the cut ends of the vessels; and there was not the slightest distention of the gall-bladder perceptible, and not a single globule of air extricated from it. A portion of the liver of the second, *in vacuo*, gave off very few air-bubbles, and

they came from the cut surface, and were evidently atmospheric air, which had adhered to it.

I have now mentioned the principal experiments which I have made to endeavour to ascertain if the animal fluids and solids contain any free air, or air which is merely confined mechanically, by the pressure of the atmosphere. I have not thought it necessary to enter into minute details, which would be equally tedious and unsatisfactory to those who are judges of such matters, and know how easy it is to give a plausible narrative of the minute circumstances of an experiment, and how difficult it is to make an experiment in an accurate and unobjectionable manner. This much I can say, without hesitation, that I have recorded no phenomenon which I have not myself witnessed, and have kept back no fact of any importance that I have noticed.

The results which I have obtained appear, to me, to warrant the general conclusion, that, in the healthy body, there is no free air contained in any of its fluids or solids; and that, when air is disengaged from a fluid or a solid, *in vacuo*, it is foreign to it; and that it has been introduced, either in consequence of disease during life, or by absorption after death; or has entered through the divided vessels during the dissection. On the first supposed source of air, it is not necessary for me, in this place, to make any remarks. That such a source does, occasionally, exist is certain; and it is not im-

probable that its occurrence is much more frequent than has yet been supposed. The second source of air, absorption after death, is unquestionable. It is well known to the practical chemist, that bladder is pervious to air, and, that any gas introduced into it, soon becomes adulterated, by an admixture of atmospheric air; and that, ere long, the gas introduced is entirely lost, having passed through the animal membrane. The phenomena of putrefaction after death, and of partial gangrene during life, are equally conclusive on this head; and the rapidity of putrefaction in hot, damp weather, is demonstrative how very readily air may be absorbed, by the texture of the body, under favourable circumstances. The third source requires little comment, for it is obvious to reason, and may be proved by experiment, and every practical anatomist is well acquainted with it.

It is my wish to avoid controversy as much as possible, and controversial criticism; and, therefore, I shall make no allusion to the experiments of those inquirers who have maintained that the blood abounds in carbonic acid gas, and that the urine occasionally affords this gas. I need not observe that, if the blood abound in a free acid gas, we might expect to find it in all the other fluids of the body, which are less alkaline than the blood; and, that we must, of necessity, find it in all parts of the body which are provided with bloodvessels. Independent of all chemical considerations, as the incompatibi-

lity of a free acid and a free alkali existing together;—independent of the results of all the experiments which I have detailed, the majority of which are decidedly in opposition to such an unchemical conclusion, the ordinary phenomena of life, and life itself, seem to be incompatible with it. Can we believe that blood, abounding in free carbonic acid gas, can circulate through the delicate texture of the body, without destroying their functions; or, in fact, that it can circulate at all in this condition? What is to prevent the disengagement of the gas, when the pressure is diminished, or when the temperature is increased, as in ascending a very lofty mountain, or in the paroxysms of an ardent fever? I suspect, that wise and provident Nature has taken special precautions to prevent the admission of such a destructive gas into the circulation. We know the effect of carbonic acid gas on the glottis; how it stimulates its muscle to spasmodic contraction, to exclude its fatal presence from the air passages. Reasoning from analogy, and from the observations already mentioned, I am inclined to infer, that, in the primæ viæ, it is prevented entering the absorbent vessels, and so excluded from the circulation, in a similar manner, by a spasm or constriction of their orifices. But on this speculation, I beg leave to say, I lay no stress. I am more disposed to offer an apology for having introduced it. In confirmation of the opinion, however it may be explained, of the exclusion of air from the circulating

fluids, I may mention the fact, that, in carefully examining the thoracic duct, in more than a hundred fatal cases, in most of which the intestines were, more or less, distended with flatus, I have never once detected air in this passage of communication; it has been either empty and collapsed, or contained a transparent lymph, or, in cases of sudden death, healthy chyle.

CORFU,
February 15. 1828.

ACCOUNT

OF A

CONTAGIOUS EPIDEMIC DISEASE,

WHICH MADE ITS APPEARANCE IN THE ISLAND OF ST CROIX, WEST INDIES, IN THE MONTH OF OCTOBER 1827.

By W. H. Ruan, M. D.

In the month of October 1827, a contagious disease, of apparently an entirely novel description, shewed itself for the first time in this island. It was communicated to the inhabitants of this by those of the neighbouring island of St Thomas, owing to the frequent intercourse between the two places. It very soon became epidemic here, and spread through the whole island. I know not how the disease originated, or was imported into St Thomas; but it is very well ascertained that it was introduced into this colony by individuals who had arrived from St Thomas, either with symptoms of the complaint already on them, or which appeared on them very soon after their arrival. Various reports and conjectures as to the mode of its introduction into St Thomas have been current; but these do not appear to have been well authenticated.

Owing to the novelty of this disease, people were at a loss by what name to call it; and, accordingly, many different appellations were bestowed on it, but none that were, in any sufficient manner, descriptive of the complaint. I must confess that I have been at a loss for a proper name. Dr Rush, in his "Account of the Bilious Remitting Fever, as it appeared in Philadelphia in the summer and autumn of the year 1780," describes an epidemic which bears some resemblance to this one, and which was there styled "Break-bone Fever," from the nature of its accompanying pains: from want of a better, I may be allowed to call the epidemic which visited this island by the same name.

The disease differs in so many essential respects from others, that I have been led to consider it as a distinct, novel, contagious, and anomalous disease, a disease *sui generis*.

The disease attacked persons of all ages, of both sexes, and of every temperament and condition in life among the white, coloured, and black population of the island. Infants only a few days old seemed as liable to the disease as those more advanced in life. I saw very distinct cases in an infant only three days old, and in an octogenarian. Persons of a sanguineous temperament, those who had been the frequent subjects of rheumatism, gout, or intermittent and remittent fevers, syphilis, and some other diseases, seemed to suffer more from this new disease than other people did. On the other hand, those who had enjoyed a generally uninterrupted

course of good health, who had not been victims to any of the above mentioned complaints, were less severely affected by it. Negroes resident on estates in the country had, on the whole, milder attacks than those who resided in town. Very few individuals entirely escaped the disease.

Generally it was sudden in its attack. In many instances, however, there were certain precursory sensations. It might, therefore, with considerable propriety, be not inaptly divided into three stages; the first stage, or that of increase; the second, or middle stage; and the third stage, or that of decrease. The first of these was not always very apparent, although, in some instances, it lasted a few days; the second was well defined by the commencement and termination of the fever, which might be called a Synocha contagiosa, and which lasted, on an average, about forty-eight hours; the third stage, or that of decrease, was of various duration, from a few days to three or four months; and this, from its long continuance, was emphatically called by many of the afflicted patients the never-ending-stage of the complaint. In this third stage, however, there was evidently a gradual, though, in very many cases, slow progression towards amendment.

The precursory symptoms, which formed the first stage, were most commonly flying pains in different parts of the body, occurring at unequal intervals of time; languor, lassitude, unusual degrees of costiveness, loss of appetite, disturbed sleep; and these, in

some instances, preceded the fever by several days. In general, however, it came on suddenly; and, in a very great majority of such cases, the order in which the symptoms made their appearance was the following. An uneasy sensation of fulness in the face, of tension, warmth and dryness of the skin of the whole body, disinclination to exertion, with drowsiness, and slight stiffness of some of the joints, were succeeded by smart fever, and an exacerbation of the pre-existing symptoms. The second stage had now commenced. The face became somewhat swollen, the skin painfully tense, dry, irritable, and extremely hot. An exanthematous eruption next made its appearance, almost always within the first twenty-four hours; at first in the face, and afterwards over the whole body. This eruption was of three kinds. In many it resembled, in its external appearance, that of scarlatina; in others, that of urticaria; and in some, that of rubeola; but in no single case did more than one species of the eruption occur. In infants, the exanthema was almost always like that of scarlatina. In all persons it lasted several days, and terminated either by small furfuraceous scales falling off, or by general desquamation of the cuticle over the whole body. In many cases, this desquamation was so rapid as to leave the subjacent parts extremely delicate and tender. The disinclination to make any exertion, and drowsiness, increased, until, in some few cases, the patients bordered on a state bearing some affinity to coma. The limbs, and particularly their

joints, both large and small, became more stiff, and extremely painful. The wrists, however, the ankles, hands, feet, and knees, were generally most affected, and gave excruciating pain on the slightest motion. These pains were so severe, that, in a great many cases, the patients would lie extended on the bed in one position, and could not venture to change it, or even to bend a finger, without experiencing great agony. The fever commenced, in many cases, with slight rigors, in some with strong ague; but these were generally of very short duration. The heat of the body returned soon after in an increased degree; the sensorial functions, in many cases, became somewhat disturbed, although but slight headache was complained of; the appetite much diminished; the sense of taste, in a marked manner, either erroneous or deficient; there was little or no thirst; the bowels almost always confined; the tongue, in most cases, of a dirty-whitish appearance; the urine nearly natural in quantity, but rather high coloured; the pulse frequent, and, in many cases, irregularly intermitting, but natural, or nearly so, in other respects; the respiration was not much altered.

Matters generally continued thus for the space of about forty-eight hours, after which the fever either abated, or disappeared entirely; and, in either case, it did so generally without sweating.

The third stage commenced. The drowsiness wore off, but all the other symptoms remained. The pains of the joints, in most cases, seemed even to become more severe, and the eruption more marked.

In a day or two, however, after the disappearance of fever, some of the other symptoms had somewhat abated. The disagreeable sensations of the face and skin, the exanthema, and heat of the body, diminished. The erroneous or deficient sense of taste, the loss of appetite, and tendency to constipation, continued, in most patients, for eight or ten days longer. The pains in the limbs and joints seldom forsook their victims so early: in a great many instances, they continue even now to give annoyance to persons who were early attacked by the epidemic.

The description which I have just given of the symptoms of this new disease, is applicable to a large majority of the cases that came under my observation. There were, of course, many others that were variously modified as to violence, duration, and the absence of some few of the above mentioned symptoms. The essential symptoms were the term of the fever; the great heat of the skin during it, and for one, two, or three days after it; the three species of exanthema; the excessive pains of the joints; and the epidemic and contagious nature of the disease.

Among my patients, I found several who were attacked by this new disease and intermittent fever on alternate days, until the former had run a course of about forty-eight hours; after which it disappeared, and the intermittent (which became quotidian) continued until put a stop to by the usual course of treatment. But, on the intermittent being checked,

the pains that help to characterise " Break-bone Fever," again returned to harass the patients for a great length of time. In all such cases, the paroxysms of the two diseases were, in a remarkably obvious manner, distinct and unmodified by each other; each of them requiring its distinct and separate treatment.

Some persons were supposed to have been attacked by the new disease oftener than once; but in no such case that I witnessed, was the subsequent attack by any means so regularly formed and marked as the first.

The disease is now much less common than it was a month ago. I met with fewer cases on the estates situated to the eastward, than on those to the westward of this town. On one estate on the east end of the island, and at a distance of about six or seven miles from town, and on another situated nearly due south, and at a similar distance from the town, a great majority of the Negroes escaped the disease; and most of those who had it were slightly affected. This circumstance I attribute to their less frequent intercourse with the town people, and to their being placed more out of the influence of the contagious atmosphere, in its range from east to west. In many of those cases, where the disease had ceased to annoy the patients, it seemed nevertheless to have given origin to some others which have proved very vexatious, and may be regarded, I am of opinion, as not unfrequent sequelæ of it. Those which I have met with are hydropic affections, particularly ana-

sarca. Abscesses in various parts of the body, cutaneous affections, and serous effusion, or a tendency to it within the cavity of the cranium.

Dropsical swellings were by no means uncommon, particularly among Negroes; and generally required prompt and very active treatment for their removal. In one case (that of a Negro girl about eight or nine years of age), it proved fatal, although the most active remedies were early employed for its cure.

Abscesses frequently formed about the time when the patients were nearly rid of the pains of "Break-bone Fever." These were, however, not deeply seated; and, on being opened, healed readily. About the same period, cutaneous affections generally occurred. These put on a scorbutic appearance; and, if much irritated by the friction of the patient's clothing, or by scratching, they were apt to terminate in troublesome ulcers. In some convalescents, when symptoms supervened which indicated any affection of the sensorium, I found it necessary to put in practice the most vigorous treatment, for the purpose of overcoming them. In such cases, the only complaint which the patient generally made at first was, that he felt more than usually unwell, and was unable to account for it; and, on being asked if he had headache, invariably replied (in every case that occurred to me), in the negative. The pulse, in all such cases, was always rather frequent. The patient generally remained thus for eight and forty hours, during which some laxative medicine was given; but at the expiration of this

space of time, his attendants were generally alarmed by a considerable degree of stupor, with some appearance of collapse in the countenance; and, when roused from this state, he complained, for the first time, of pain in the head. The pulse had now become very frequent, but otherwise nearly natural; and the tongue always blanched. It has been generally at this period that my professional attendance has been required. When called more early, I never failed to observe, in the countenances of my patients, a certain listlessness of expression, which, after the first two or three cases that I met with, always excited my particular attention. The first cases of this kind to which I was called, had nearly been attended with fatal results, owing to the insidious nature of the attack; and hence the most minute and close attention became necessary to detect and obviate it. One fatal case of this description proved so in about eighteen to twenty hours after the supervention of stupor. In convalescents from "Break-bone Fever," who were thus attacked, the remedies which I chiefly employed were two or three brisk purgatives given early; and, if possible, before the coming on of stupor; calomel in grain doses, three or four times a-day, and external stimuli extensively applied; among the latter were blisters; and these I directed to be dressed with ung. hydrarg. fort.; hot and stimulating applications were constantly kept to the hands and feet. I met with about a dozen cases of this kind.

I can entertain little or no doubt of this disease

being a contagious one. It is pretty well ascertained, that it was brought hither by persons recently arrived from St Thomas's where the disease prevailed; and that, shortly after, it was communicated to individuals residing near them, and that it immediately after spread, with great rapidity, through the whole island. Perhaps the novelty of the disease may also, not improperly, be considered as some little additional proof of its contagious nature. Although I am unable to say what the nature of the contagious matter may be, whence produced, or how it may have been generated, yet I think I am warranted by the peculiarities of the disease, and its concomitant circumstances, to conclude that it does arise from, and is propagated by, a specific contagion. The manner in which the disease spread through the island is, I think, a pretty conclusive argument in favour of its contagious nature. It first shewed itself in this town (Christianstad); then on the estates to the westward of it, and had extended to a considerable distance in that direction, following the course of our Trade Wind, before I observed a single case of it on the estates to the eastward of the town. On an estate that lies nearly south from the town, and distant about five miles, the disease was of a much milder nature, and attacked but few of the Negroes. On several estates I ascertained distinctly that the disease had been communicated to the Negroes by some one of them who had been in the town, had there become infected by it, and returned to the estate with the disease on them. This

disease appears to differ, in several essential characters, from every other that I am acquainted with. It is distinguished from rheumatism by its contagious nature, by the attendant exanthema, by an invariable determination to the head, to a greater or less degree, by its mode of attack, and perhaps by its sequelæ. The diagnosis between it and the different genera of exanthemata, is marked by the accompanying pains, and by the eruption not being invariably the same, although it bears a considerable resemblance to them in many other respects. This disease seems to be of a mixed nature, partaking of the orders Phlegmasiæ and Exanthemata of Dr Cullen. The diagnosis between it and other diseases is sufficiently obvious.

Fortunately, it has been very seldom fatal. I have only met with three cases in which it ultimately proved so; and in all of these it did so by its sequelæ. One of these cases was the Negro child who became dropsical, and of whom I have already made mention. Immediately previous to her being attacked by "Break-bone Fever," she had been put under a course of vermifuge medicines, and had voided many worms. The other two fatal cases were from supervening disease of the brain. One of these, an adult Negro, about forty years of age, I have already alluded to: to the other, a mulatto girl, about seventeen years old, I was only called when she was moribund. The number of patients under my care, at different times, must at least have exceeded a thousand in number.

The disease, early in the course of the epidemic, almost always made its attack with symptoms apparently so formidable, that it never failed to alarm the patient a good deal, and to excite the close attention of his physician. The latter person, on account of the novelty of the complaint, was unable to propose to himself any systematic *consilia medendi*, and was therefore obliged merely to prescribe for the symptoms. As might be anticipated, purgatives, venæsection, the warm and cold baths, diaphoretics, and low vegetable diet, were the remedies principally used in the first and second stages; while laxatives, sudorifics, anodynes, embrocations of various kinds, diuretics, and epispastics were had recourse to in the last stage of the disease.

I met with only two persons who appeared to require bleeding, both of them of plethoric habit. From the one I abstracted from eighteen to twenty ounces of blood, and some immediate relief was thereby obtained for a short time, but the disease seemed ultimately to run its usual course. From the other patient I had taken only about six ounces of blood, when syncope came on. In this instance, however, the bleeding seemed to be attended with a more beneficial result; at all events, the case turned out a milder one than I had reason to expect from the violence of the incipient symptoms. In both cases, other remedies were of course not neglected.

Purgatives seemed to me to be the most useful class of remedies.

Those which I chiefly employed were calomel, jalap, sulphate of magnesia, oil of croton tiglium in a few cases, and some others of a milder nature. I found that a brisk purgative of calomel and jalap, given very early, and repeated two or three times, in the first stage of the disease (when this admitted of it), was attended with beneficial effects. In those cases where the individuals were forewarned of an attack of the epidemic, and where this purgative had been used once or twice before the coming on of the fever, a very happy result was experienced; the disease seemed, in most instances, to be very much mitigated by it; the consecutive fever, with its attendant symptoms, were not only less violent, but the subsequent pains were also less severe; and the latter, as well as the eruption, were of shorter duration. In general, I found the bowels in a constipated state in the beginning of the complaint, and also in a degree of torpor that made it necessary to repeat and vary the purgative in order to move them effectually. In a few cases where two or three cathartic doses had been administered without producing much effect, I gave from one to three drops of croton oil, which always brought on the desired catharsis; and in all these cases, the patient seemed to have derived much benefit. On the whole, purgatives appeared to me to give more general and permanent relief than any other remedies.

The warm and cold baths were used; but they were uncertain in their effects. Such relief as they did at any time give, was but of a temporary na-

ture; and the inconvenience to the patients of using them, arising from the severe pains of the limbs, was such as to prevent many from having recourse to them frequently. The cold bath, although tried during the presence of the fever, was principally employed after it had disappeared; but in neither case did it seem to do much good.

Sudorifics were repeatedly made use of; but in no instance that came under my observation, nor in any stage of the disease, had they the desired effect. Opiates were used plentifully, particularly in the last stage, but with very little benefit at any time. Laxatives, frequently administered, and diuretics, gave most relief to the patients in the third stage of the complaint. These two last mentioned kinds of remedies, in fact, with warm clothing, appeared to me to be those alone which procured any thing like permanent alleviation of the pains. Embrocations, varied almost *ad infinitum*, and blisters, were tried in the third stage, but seldom with much permanent happy effect.

The low vegetable diet, although strictly enjoined in the first and second stages, was seldom persevered in during the last stage of the complaint. On the contrary, the loss of the sense of taste induced many patients to make use of the most stimulating food; and, in such, it seemed to do good, by restoring the appetite, and making the patient feel generally less uncomfortable.

I have already stated, that I only met with three fatal cases of this disease, and that these three

proved fatal from its sequelæ. I had only an opportunity of examining the body of one of them, after death, that of the adult Negro who died from cerebral disease. In this case, the abdominal and thoracic contents were, in every respect, natural and healthy. On opening the head, the investing meninges of the cerebrum and cerebellum were found to be rather more vascular than they generally are; the substance of the brain felt firmer than usual; in the ventricles were found about four ounces of serum; the choroid plexus was unusually pale; and the cerebellum and medulla oblongata were covered, on all sides, by a puriform fluid. It is worthy of remark, that this man did not complain of headache until about twenty hours before his death; that he had almost entirely recovered from the pains of "Break-bone Fever;" and that he made no complaint of feeling sick in other respects, until four days previous to his death. The joints, which had been the principal seats of pain, were natural in appearance.

Although I have adopted for this disease, the popular name of "Break-bone Fever," yet I would remark that there appears to me a very considerable difference between this and the disease which Dr Rush describes as having been epidemic in Philadelphia, in 1780. This circumstance, I think, will be sufficiently evident on a reference to Dr Rush's publication. Many popular appellations have been bestowed on the disease, some of them very fanci-

ful, and perhaps the one that I have adopted is equally so.

I have endeavoured throughout, to give an accurate account of the disease, as it came under my observation, and of the effects produced by the remedies which I employed. Although it be neither agreeable to the physician that a new and vexatious disease should require from him an additional portion of his study and attention, nor consolatory to humanity that it should have an additional source of suffering, yet as it has appeared to me to be a disease *sui generis*, and essentially different from all I have hitherto known, I have felt myself bound to consider and represent it in that light. It has fortunately not proved very fatal; but perhaps few diseases occasion so much exquisite suffering as the one we have been considering.

St Croix, *March* 1828.

CASES

IN WHICH

POISONOUS EFFECTS

WERE PRODUCED BY SWALLOWING THE SEEDS OF THE

DATURA ARBOREA.

By A. H. Renton, M. D. &c. &c. Madeira.

Funchal, 27th March 1828.—Between 10 and 11 P. M. I was desired to see Anne Smith, aged 10, whom I found to be surrounded with friends anxiously watching her motions. It being the eve of her embarkation for England, she had been spending the afternoon, at a short distance from town, with the family of Mr Blandy, and had been observed, towards the latter part of the evening, to become unusually riotous and loquacious. This state of animation being very naturally ascribed to the joyousness produced by the congregation of a number of children for the celebration of a holiday, and to her being then permitted, on this leave-taking occasion, to take probably a little more wine than was advisable, excited but little attention. On its being observed, however, to alternate with short fits of stupor, the friends became alarmed, and dispatched her, in a well guarded palanquin, to Funchal. No rational answer could be got to any questions put to her.

Symptoms.—The countenance is flushed, its expression wild and wandering; pupils largely dilated, and, on the approach of a lighted candle, immoveable; extreme restlessness; temperature of skin above the usual standard; pulse small and very rapid; tongue furred. On being taken out of bed and carried to some distance from it, she seems, when left to her own guidance, incapable of finding her way back. Her gait is staggering, and her vision apparently very indistinct. An emetic was ordered, and, after its operation, a stimulating enema.

28. No effect either from the emetic or the enema, but she has had two motions this morning from a dose of castor oil. She has had but little sleep, and her manner is still confused. Pupils smaller; tongue white and loaded; pulse 110, regular. Infus. sennæ.

29. Full effect from the senna. She has slept well, and seems now completely herself again. She sails this evening for England.

At midnight I was called to see Frederick Blandy, a fine boy, five years old, who had, of course, taken a very active part in the gaieties of the preceding evening, and who, like his play-fellow, was doomed to partake of its gravities.

In this case the symptoms, although rather later in shewing themselves, were much more violent and alarming. At first, as in the preceding one, a high degree of excitement merely was observed, and which, by dint of coaxing, had ended in *sleep*, which, though

much disturbed, had continued for nearly an *hour and a-half*. Out of this, however, the boy suddenly awoke, screaming most violently, and in a state of such ungovernable delirium, that, in spite of the utmost efforts of his father to restrain him, he repeatedly dashed his head against such objects as were nearest to him, and bruised himself severely.

Symptoms.—Pupils dilated to their full extent, and there is not the slightest manifestation of sensibility observed on the near approach of a lighted paper; face flushed; but the general temperature, particularly that of the extremities, below the healthy standard; state of the pulse not accurately ascertained, but it seems at the wrist to be, as in the other case, small and innumerable. There appears to be no griping, and there is neither fulness nor tenderness of the abdomen.

On seeing the child Smith, the symptoms so strongly resembled that of intoxication, that I had little hesitation in agreeing in opinion with the friends, that they were attributable to an overdose of wine, and left her with hardly any anxiety about the result. The occurrence of the second case, however, gives to the subject a very different, and, considering the age of the patients, somewhat of a puzzling aspect. From the similarity of the symptoms, though differing greatly in their degree of violence, and from the children having been together during the whole of the afternoon, the natural conclusion was, that something of a deleterious quality had been

swallowed by both of them; and as no information could be obtained from them, or from any of the friends, as to the probable nature of what had been taken, the severity of the symptoms in this (Blandy's) case was sufficiently calculated to excite both anxiety and alarm. The question as to their being the effect of the ordinary causes of intoxication, was disposed of by the difficulty in getting the child to sleep, its disturbed and restless character, and, principally, on the boy's awakening from it, by the *increased and continued* delirium.

Tartar-emetic and ipecacuanha having been previously administered without effect, I poured down a solution of the sulphate of zinc, and on that, too, failing to produce vomiting, had recourse to the stomach-pump, by which only a small quantity of coloured fluid, in addition to the water which had been injected, was brought up. On withdrawing the œsophagus tube, however, the child gulped up, amongst "baser matter," some seeds which proved to be those of Datura arborea. The intestines partook of the torpor of the upper part of the canal. A stimulating enema, to nearly the amount of a pint, was injected and retained; and on its being repeated still stronger, the whole was, after a time, returned without any admixture of feculent matter. The boy, however, having become much more tranquil, I left him at 3 P. M., having desired Mr Blandy to get down a dose of jalap before allowing him to fall asleep (should he be so disposed), and to

follow that up by repeated doses of castor oil until the bowels should be thoroughly evacuated.

28th, 10 A. M. He has had no sleep, but has raved and tossed about continually; at present he is more quiet and manageable, and seems to know me. Pupils still widely dilated, but more sensible to the stimulus of light. The jalap (8 grs.) and castor oil (℥ss) were now given, but there has been no evacuation. Rep. Ol. Ricini.

6 P. M. There have been frequent clay-coloured motions. Pupils still dilated. He is going about the room extremely fretful and peevish.

On the following day he was quite well.

I have taken the liberty of forwarding to the Society the preceding cases, as illustrative of the poisonous effects of the seeds of the Datura arborea. The symptoms bear a strong family likeness to those arising from an overdose of the other sorts of datura; but as the poisonous qualities of *this* species have not (so far as I know) been made so generally known, I am induced to hope that a recital of the mischievous consequences produced by it may not prove altogether uninteresting.

The tree here grows and flourishes, and is to be met with in almost every garden in the neighbourhood of Funchal. But it *very rarely* gives seed, and but for the ingenuity of these children in finding it out, I might have remained ignorant of its *ever* doing so in this climate. From the state of the capsule, which was found the following morning, it appeared that six or eight of the seeds had been ex-

tracted, the greater number of which had been swallowed by the boy Blandy. Never having previously seen them, I was made but little the wiser by their ejection from his stomach; and I have great pleasure in acknowledging my obligations to my friend, the Rev. Mr Lowe, for the information which he was good enough to give me as to their parentage*.

A. H. RENTON, M. D.

FUNCHAL, MADEIRA,
5th April 1828.

* They were in an unripe state, and nearly an hour must have elapsed between the time at which they were swallowed and the appearance of the symptoms.

OBSERVATIONS

ON

JAMES'S POWDER,

AND THE

ANTIMONIAL POWDER OF THE LONDON PHARMACOPŒIA.

By John Davy, M. D. F. R. S.

I shall have the honour in this paper to submit to the Society, the results of the experiments I have made to ascertain if any difference of composition exists between James's powder and the antimonial powder; and, consequently, if the preference which is given to the former, even by scientific physicians, be well or ill founded. As the subject is of some importance in relation to the practice of physic, independent of all economical considerations, I trust I need not offer an apology for entering into some minute details to avoid obscurity, and render the proofs as conclusive as possible.

The specific gravity of James's powder, I find to be 4.0; that of the antimonial powder about 3.7.

Before the blowpipe, on a supporter of glass or calcined bone, in the red part of the flame, James's powder does not melt, or emit any sensible fume. The antimonial powder, in the same circumstances, yields a fume similar to that emitted by the protoxide of antimony. In the blue part of the flame both preparations emit dense fumes, and on a platinum supporter, an alloy of antimony is rapidly formed, of easy fusibility.

Heated as strongly as possible in a green glass tube, neither affords any sublimate, or elastic fluid, nor gives off any volatile matter, when previously freed from adhering moisture, by exposure to the temperature of boiling water; and neither of them fuses. When cold, James's powder is found agglutinated in the slightest manner possible; the antimonial powder in a more considerable degree.

When James's powder is digested for a few minutes in strong muriatic acid, a glass-rod dipped into the acid produces no cloudiness; no white precipitate when put into water. But this effect is distinctly produced when the same experiment is made with the antimonial powder.

When James's powder is digested in strong muriatic acid for several hours, and the clear acid solution formed of a lemon colour is mixed with water, a slight white precipitate is produced, about .8 per cent. When the antimonial powder is similarly

treated, the solution formed, is of a bright orange colour, and the precipitate by water much more copious, about 6.7 per cent.

The precipitate by water from James's powder, washed with a weak solution of ammonia and dried, is of a light fawn colour; it emits fumes before the blowpipe, when heated on a glass supporter; it is very readily soluble in muriatic acid, and it fuses at a dull red heat, in a glass-tube; and does not sublime or volatilize, when the temperature is raised as high as possible. The precipitate from the antimonial powder is similar in most of its properties; it differs chiefly in being of a light brown colour, in its dry state, and of a dark brown when fused.

The residue from James's powder, undissolved by the acid, after being well washed and dried, is about 49.5 per cent.; that from the antimonial powder is about 38.3 per cent. Both are similar; perfectly white, fixed and infusible at the melting point of green glass, and apparently quite insoluble in muriatic acid, of specific gravity 1.134.

When James's powder is digested in strong nitric acid, evaporated to dryness, and heated to dull redness, it does not perceptibly increase in weight. The antimonial powder similarly treated gains a very little, after which it does not emit fumes before the blowpipe, nor is its muriatic solution precipitated by water.

When James's powder is digested for several

days in muriatic acid, largely diluted, it loses about 55 per cent.; the antimonial powder loses about 50 per cent. Both solutions are copiously precipitated by ammonia, and the precipitates have all the properties of phosphate of lime; and, besides phosphate of lime, I have detected nothing in the solution of either, excepting a trace of magnesia or iron.

From these experiments, then, it appears that James's powder consists of about

.8 Fusible oxide of antimony,
49.5 Oxide of antimony, insoluble in muriatic acid,
50.7 Phosphate of lime, with a trace of magnesia:

And that the antimonial powder consists of about

6.7 Fusible oxide of antimony,
38.3 Oxide of antimony insoluble in muriatic acid,
55.0 Phosphate of lime, with a trace of magnesia:

And, consequently, that the principal difference between the two is, that James's powder contains a much smaller proportion of the fusible oxide than the antimonial powder.

By the fusible oxide of antimony, I mean the protoxide of Proust, which, by experiments made for the sake of comparison, I find melts at a dull red heat, or rather below that temperature, is fixed at the melting point of glass in a tube with a very narrow neck, emits white fumes when heated in the open air, and is very soluble in muriatic acid; 100 parts of which, of specific gravity 1.134, take

up 26 per cent., thus 56.3 grains of this acid dissolve 14 grains of the oxide.

It has been noticed, that the oxide in question obtained from the antimonial powder is more strongly coloured than that from James's powder. Of the cause of this colour I have not perfectly satisfied myself. From the experiments I have made, I am disposed to attribute it to the presence of a minute portion of peroxide of iron, intimately combined with the protoxide of antimony; however, as it does not appear to be of consequence in relation to the main subject, I shall decline considering it farther at present.

By the oxide insoluble in muriatic acid, I mean the peroxide of Proust, which I find, by comparative experiments, neither melts nor sublimes at the melting point of green glass; which does not emit fumes, even when heated in the open air, or volatilize, excepting part of its oxigen be abstracted, either by the action of inflammable matter having a strong attraction for oxigen, or by the action of a metal having a strong attraction for antimony; and which is not perceptibly soluble in muriatic acid. Thus .1 grain of it was digested for several hours in 90 grains of the acid, the specific gravity of which has been already stated, without sensible diminution of its bulk.

Having now endeavoured to shew what is the real nature of James's powder, and the antimonial powder, the next question which presents itself for

consideration is, whether James's powder is deserving of the preference which has been given to it by the most respectable and judicious physicians.

To endeavour to answer this question, it is necessary to consider the medicinal effects of protoxide and peroxide of antimony. As far as my experience of the former extends, the protoxide is not a very active medicine, nor certain in its operation; a dose of ten grains of it, sometimes has an emetic effect, and sometimes an aperient, and sometimes no sensible effect whatever. Yet it is less inactive than the peroxide, twenty grains of which have seldom produced any well marked effects, when given to an adult, either in health, or labouring under disease. And, in conformity with this experience, I find that James's powder possesses very little activity, and that it may be taken in doses of twenty and even of sixty grains with safety, in which quantities its usual effect is purgative, followed by relaxation of the skin, and an increased tendency to perspire. My experience of the effects of the antimonial powder is also in conformity with the preceding observations on the oxides, and I find that it is very little more active than James's powder, and that it may be given with safety in doses nearly equally large. The necessary conclusion, then, is, that if either preparation be deserving of preference for its mildness of effect, it is James's powder.

Whether it is deserving of the high reputation which it possesses amongst the medical profession,

this is not a proper place to consider. I shall simply remark, that unless the preparation first employed by Dr James was more active than, or different in its composition from, the present, which is recommended by bearing his name, I believe its virtues as well as its effects to be greatly exaggerated, and that it has had credit for cures which were owing to other medicines given with it, or to the effects of nature alone,—that is, of the vital powers acting to effect the restoration of health.

Should it be considered advantageous to make the antimonial powder exactly similar to James's powder, it may easily be accomplished, by mixing in due proportions the respective oxides with phosphate of lime. The peroxide may be economically procured either by calcining sulphuret of antimony in an open fire, or by deflagrating the sulphuret with nitre, in the manner in which the old diaphoretic antimony was formerly prepared. If the former method is used, after calcination the oxide should be washed with muriatic acid to separate any residual protoxide: If the *latter*, of course, water should be first employed to remove the alkaline salt, and afterwards muriatic acid to purify the peroxide. It is needless to point out how the protoxide may be best obtained, if it be considered advisable to add it in the very small proportion in which it exists in James's powder.

I have not thought it necessary to allude to former analyses of James's powder, and more especially

to Dr Pearson's and Mr Chenevix's analyses of this secret medicine, (the results of which I believe, do not altogether agree with mine), partly, because I have it not in my power in this place to consult their original papers, and partly because the subject of them being a *secret* medicine, its composition may have been changed since their experiments were instituted.

MALTA,
Sept. 12. 1828.

MEMOIR

OF THE

DISEASES OF THE BRITISH TROOPS

DURING THE BURMAN WAR.

By Assistant-Surgeon WALSH, of the 89th Regiment.

IN attempting to account for the frightful mortality that occurred during the Burman war, it may be necessary to introduce a medico-topographical sketch of the country, and of the peculiar circumstances to which the naval and military forces had been exposed. A comparison, also, of the more violent diseases under which our troops suffered, with those of Hither India, whose more prominent symptoms hold some correspondence, may, perhaps, afford further elucidation.

Of the Indian Peninsula, and its sources of morbific action, so much has been written, that its topography need scarcely be adverted to, unless for comparative effect with the recent seat of war. The diseases of India, citra and extra Gangem, evince as marked an analogy as their respective localities and

parallels of latitude could admit. Whenever deviations occurred from the ordinary course of morbid action, it might perhaps be ascribed to the rapid transition from the wholesome diet, comfortable accommodation, vigilant superintendence, and minute attention to their wants, enjoyed by the soldiery when in cantonments in Hindostan; to all which, there existed in Burmah a miserable and melancholy reverse.

The Burrampooter, from its source in the southern extremity of the Himalaya mountains, to its union with the Ganges or termination in the Megna, appears to form a more correct boundary between India, properly so called, and that portion of Indo-China constituting the Burman empire, as it existed before our territorial acquisitions. This line of division with the great Indian delta, running W. and S.W., somewhat parallel to that mountainous chain, extending in the same direction from the Imaus, in unbroken, yet diversified continuity, presents nearly the same morbific causes, the same field for investigation, as the Irriwaddy, or great river of Ava. It rises at no great distance from the former, and pursues a course nearly similar; but, during its whole extent, at the eastern side of that chain, under its subdivisional names of Assam, Cachar, Tipperah, Arracan and Kian mountains. The Irriwaddy, soon after its arrival in Pegu, sends off many branches, which communicate and ramify, in amazing diversity, through that province, forming a delta, and an interprovincial navigation, much superior in extent to

that of the Megna. These two great rivers receive many streams from the above-mentioned mountains, yet their waters occasionally exhibit a marked difference. That of the Burrampooter, at many points of its course, becomes, after having been undisturbed, clear, soft and well-tasted, without argil, lime or mica in the deposit; while the water of the Irriwaddy, particularly after the commencement of the rains, contains these three substances. It is incapable of being cleared by subsidence or filtration, and always exhibits a lightish milky colour. The banks of the river consist of alluvian strata in great diversity, calcareous earth, pipe-clay and schistose alumina, with a variety of soils, deposited in layers, according to their respective gravities. The banks of the Burrampooter appear to consist of a more uniform deposition of common earth, without any trace of petrifactions in its waters; while the banks and bed of the Burman river exhibit, for miles, few other stony concretions than those formed from the petrifaction of various woods, occasionally met with in masses of some magnitude. The petrifactions retain the fibrous appearance of the wood, though differing much in specific gravity.

These great deltas, forming alluvium to a great extent, covered with wood and jungle, in nearly equal density, exhibit much uniformity of disease; yet a marked deviation has been occasionally manifested, in the difference of type and degree of mortality, particularly in dysentery and remittent fever. This modification of disease could not have arisen from

the geographical difference merely of a few degrees of latitude and longitude; while their respective peculiarities of climate, products, &c. bear a striking analogy. It must, therefore, be sought for in those circumstances alluded to, to which the expeditionary force had been so unseasonably and so unfortunately exposed.

The expedition was undertaken at the beginning of the S.W. monsoon, or rainy season. Little further could therefore be achieved than the capture and occupation of Rangoon, and the guarding against a coup-de-main from the numerous parties of the enemy entrenched at various points, but gradually concentrating about our position. It became therefore necessary to dislodge them from every stockade, as soon as we had ascertained its existence: thus occasioning a system of warfare, more incessant, more harassing, and more wasteful of health and of life, than any recorded in British history. Divisions and detachments were, sometimes once or twice, and occasionally three times a-week, ordered into the jungle for reconnoissance or attack, during one of the severest monsoons recollected in the country; without roads, land-marks, or bridges, in the almost general inundation of the low country, frequently to the height of several feet. During the first four months, the troops were obliged not merely to grope their way, or wade above the knees or hips for ten or twelve miles, often falling in the mud and water, but were occasionally obliged to swim, frequently without meeting an enemy; and, when found, and driven from his stockade or entrench-

ment, it was, perhaps, in two or three days, re-occupied and better strengthened. The same routine, therefore, of wading, swimming and attack, was repeated, with little other possible results than the rapid diminution of our force by disease or death—a result on which the Burmans contemplated with exulting certainty.

The occupation of the great pagoda (Shoe-dagon), about three miles north of Rangoon, called for the support of the greater part of the force, in two or more lines, including a large park of artillery, nearly in their centre. The troops, principally European, thus stationed, were obliged, in numbers, to proceed once or twice a-day to Rangoon for their rations, exposed to alternate deluges of rain, and to a torrid sun; subjected, in a few hours, to sudden and frequent changes of temperature, from about 70° of Fahrenheit to upwards of 100°, when the unclouded sun burst upon them. The men, therefore, sickened in great numbers, notwithstanding all the regimental and other precautions that could be adopted; and sometimes only few officers were capable of ordinary duty.

In consequence of a medical representation, the services of the public porters and vehicles were directed to be more generally extended, they having been previously confined to the accommodation of only one or two corps.

The seeds of morbid action, so unsparingly laid, soon vegetated with extraordinary vigour. Sickness and mortality, bordering on comparative annihilation,

quickly ensued. The deaths in the 89th regiment sometimes averaged 100 per week—a number exceeded in other corps. The aggregate of deaths during the first three months, exclusive of casualties in action, must have amounted to upwards of 3000 Europeans, or more than one half of the force originally despatched!

The rations of the soldiers during these melancholy events were badly calculated to protect from disease, or to promote convalescence, which was generally doubtful. The biscuit was frequently rotten, mouldy, and so much occupied by large maggots and other insects, as to be, occasionally, almost capable of locomotion. The beef and pork were often so rancid as to be incapable of being freed, by ablution, from stench and animalcula, in a state of incessant reproduction and decay. The rice, also, was sometimes unsound, and the rum or arrack, generally in a state of too great dilution to excite sufficient energy in the soldiers, sinking under extreme fatigue or protracted convalescence *.

Europeans, in tropical climates, particularly in India, are always in such a state of bodily susceptibility, as to admit of powerful influence from morbific causes, to which they are incessantly exposed; though

* To the credit of the Madras local government, it must be said, that, as soon as this want of equipment, with its horrible train of consequences, was known, a large supply of every requisite for the restoration or preservation of health was immediately furnished, and most liberally distributed among the hospitals of its division.

occasionally modified into no small diversity of character, the endemic becoming epidemic, often with increased exasperation of type, or exhibiting disease of a varied or perhaps opposite description. How else is the rapid transition that occurred in Burmah to be accounted for, wherein bilious remittent subsided, and was immediately succeeded by intermittent or rheumatic fever, by dysentery or cholera, frequently so violent as could not have been anticipated, after the gradual amelioration of those untoward circumstances, inadequately sketched, but productive of the most terrific effects?

Vegeto-animal miasm, may, indeed, have acquired a more specific agency, and a higher degree of concentration, than it possessed on our arrival; and may, therefore, have evinced increased virulence, and, possibly, a variety of action, proportionate to this additional power; to which, extreme exhaustion, that supervened under such a combination of circumstances, and to which the whole force had been incessantly exposed, must have not a little contributed.

The principal diseases of this period, while military operations were confined to the great delta of Pegu, were, remittent, intermittent and rheumatic fevers, with cholera and dysentery; the two former, sometimes alternated, were almost always violent, and often fatal. Such were the general results, at least of those of later occurrence. The rheumatic rapidly verged into an extremely troublesome chronic state, and was rendered particularly obstinate from the necessity of frequent exposure to wet, when, per-

haps under mercurial influence,—a necessity becoming daily more imperious, and calling particularly for individual exertion, in consequence of the increased prevalence of sickness through every branch of the force.

The bilious remittent did not always exhibit an equal degree of violence. In some early cases it soon intermitted, or wholly subsided, without manifesting much febrile or cerebral excitement; and yielded in a few days to purgatives, pediluvia, saline diaphoretics, and cold applications to the head, with occasional topical or general cold affusions. But those of later occurrence, or relapsed cases, were generally attended with high febrile excitement and sensorial disturbance. In the primary severe cases of this nature, the head was always affected with excruciating pain; at first in the frontal and temporal regions, and gradually extending to the occipital and parietal. This was accompanied with a perceptible pulsatory action of the cranial contents,—so violent, as, when touched, to cause on its external surface a feeling of excessive soreness, resembling the effect of severely inflicted contusion. The eyes soon became inflamed, painful, protruded and intolerant of light.

This determination to the head generally occurred with great rapidity; and not being marked by very obvious premonitory symptoms, can be attributed only to some powerful agent, to the operation of which, the variety of predisposing causes alluded to must have materially, though in a varied degree, contributed. This agent can be found only in the at-

mosphere, impregnated to various degrees of concentration and malignity, with vegeto-animal matter in a state of putrefaction and decay;—to the formation of which heat and moisture are indispensable,—both always abundantly furnished during the south-west monsoon.

The immediate effect of this poison, is, I believe, universally admitted to be sedative: hence the cerebral disturbance and consequent derangement of the nervous system. "The balance of the circulation is soon, of course, broken; and more or less of congestion, local inflammation, or other topical affection, is likely to take place," as the natural result of miasmal influence, and the violent action that too often immediately supervened. Derangement or congestion in some of the abdominal organs, at least those connected with the chylo-poietic viscera, would appear to have arisen synchronously with the cerebral, or at least to have advanced *pari passu* with them; but perhaps, to have differently operated. The heart and arterial circulation, always easily roused even by a very trifling cause, could not have remained long unaffected during this general disturbance. Hence the violent impetus to the head, and 'remora in the portal circle'—the one in a state of inordinate excitement, while the chief organ of the latter had been in a state of torpor. The excruciating affection of the head and eyes, and the excessive heat and pain about the precordia, may thus be accounted for.

The first step, then, in the methodus medendi,

can, in this stage of the complaint, be scarcely mistaken. Bleeding ad deliquium must be most freely practised, during the first few hours of attack, or state of violent reaction; and must be repeated, if not attended with diminution and general relief to the more urgent symptoms. The reduction of the phlogistic diathesis may afford time for the successful use of other measures.

A frequent discharge of vitiated bile, during the gastric irritability, so generally attendant on cases of this nature, and an altered state of the secretions and skin, arising from derangement of this viscus, with probably some other unascertained morbid action, gave sometimes to the disease the more marked features of the great western endemic. Hence the necessity for purgatives, and the full and speedy production of mercurial action. Purgatives are in no cases more useful than in tropical fever. Mercury, from its peculiar action on the glandular system, should, as speedily as possible, be separately and conjointly used, not merely as an adjuvant to other purgatives, but fully to impregnate the system. Whether from their supposed incompatibility, it may be inferred that the febrile action would subside, as the mercurial would advance, or whatever may be its modus operandi, its value is unquestionable. Too high a degree of phlogistic excitement, or much exhaustion, is extremely unfavourable to the action of this medicine. Exhaustion, not likely to occur except in protracted cases, must be combated by stimulants, so as to rouse the ab-

sorbents to requisite action. In the progress of the disease, we may, perhaps, use cold topical affusions, at least cold applications to the head, freed from its hair, saline diaphoretics, blisters, sinapisms, and pediluvia. Obstinate remains of local affection, to be treated by friction, fomentations, cupping, blisters, &c. Subsequent debility to be counteracted by a well regulated course of tonics and diet.

Change of climate, as soon as possible, and the most agreeable modes of gestation, are indispensable. On the approach of the complaint, thorough ventilation should not only be attended to, but the patient should, if possible, be removed to another atmosphere: as, although remittent fever may have been fully formed, he is still exposed to increased exasperation, if within the influence of the originally exciting cause. Removal must afford also a better chance of favourable action for medicine and for convalescence, contrary to the opinion of Dr CULLEN,—"That the remote cause of fever ceases, as soon as the disease has fully developed itself." *

Emetics, hitherto used in all cases of fever, are now generally rejected; as they are apt to injure in most stages of bilious remittents, while the impe-

* These conclusions of Dr James Johnson, I have often found confirmed, and most strikingly in my own case. A more perfect remission almost immediately ensued, and a diminution of the most prominent symptoms, and a speedy change of type to the intermittent: which after much irregularity and severity, yielded to cinchona, with purgatives and mercurials. The latter were required for some remaining hepatic uneasiness.

tus of blood to the head is undiminished, or while the gastric irritability is excessive. Antimonials, given so as to cause, or for some time to continue, slight nausea, or with calomel, to produce a specific or febrifuge effect, sometimes very advantageously assisted in lowering the tone of the system. But antimonials, particularly as emetics, appear to be rather universally contraindicated in tropical disease. They frequently cause spasms, more or less diffused; and sometimes even cholera, from the convulsive straining so apt to become excessive.

Saline cathartics, at least in a full dose, were sometimes rather inadmissible, from the apprehension of a similar effect—an occurrence not unfrequent, when the predisposition to spasmodic disease may have become rather general. This did not for some time particularly strike me; having never heard of or remarked such a case, during my service in Europe or America, till suggested by my estimable and talented friend, Dr Daun, the late surgeon of the corps.

Such were the origin, symptoms and progress of this truly formidable disease; which, notwithstanding the most persevering efforts, were, in the great majority of cases, so deplorably obstinate; and in very many fatal.

The primary and secondary intermittents of the Pegu Delta, evinced at their commencement, nearly the same general characters as those of Bengal; but modified by miasmal concentration, unsound rations, and great fatigue. The periods of intermission were soon extended or curtailed, and continued

so irregular as to confound their classification. The accessions or duration of the paroxysm were seldom certain. The diseases would sometimes, during an interval or two, assume the character of the virulent remittent, with great cerebral uneasiness and epigastric derangement. Even the more steady intermittents were often so violent as to defeat, not unfrequently, every effort of the medical officer.

In the early stages of the more violent and irregular, treatment was pursued as similar to that of the severe remittent as the symptoms would admit. When the system was not much broken down, and when cerebral or other local determination, with pyrexia, continued, topical and general bleeding, and mercurials and purgatives, were used nearly as in remittents. When the local determination and disturbance was much reduced, cold affusions, anodynes, tonics and corroborants, were exhibited.

The Pegu intermittent was occasionally accompanied by a feeling of intense anxiety and alarm, bordering on terror, and apparently unconnected with topical or general excitement. It required, if not contraindicated, the liberal use of opiates. In my own case, which was a secondary intermittent of the extremely irregular description, I was obliged, though labouring under much cerebral and hepatic disturbance, freely to use opiates. If the overpowering depression and indescribable alarm with which I had been seized, had not been immediately relieved, death, or mental alienation, must have ensued.

The opiate soon caused a pleasing change of feeling, that speedily ended in sound sleep, profuse perspiration, and solution of the paroxysm. When even trifling topical affection existed, I previously entertained strong objection to opium; and for my own wants used it unwillingly, it having always stimulated and prevented sleep. During some years' practice in India, I yielded perhaps too much to this prejudice: and may have withheld from my patient much alleviation of his sufferings, and from myself the satisfaction of witnessing it.

Cinchona appeared to me as objectionable as opium, in consequence of its almost total inertness in the intermittents of Belgium and North America, where I had seen it rather extensively tried. But its beneficial effects in Pegu were most decisive, whether from a superiority in the quality of the bark I cannot say. I prescribed it for others, rather in accordance with custom than with hope of advantage; and used it myself, in compliance with the wish of a medical friend: and, in a great variety of unpromising cases, I was agreeably undeceived.

These intermittents were extremely liable to return, even after long intervals: and the relapses were not only more frequent than in other countries, but their irregularity and severity were often much increased. I have observed the recurrence of ague, from a short exposure to a current of cold air, after sudden momentary exertion: and even from a large draught of cold water, when advanced conval-

essence and returning strength, flattered with the hope of certain recovery.

Arsenic was not, I believe, often used: but I had elsewhere abundant proofs of its general inefficacy.

It may be supposed that opportunities of anatomical investigation, so prodigally furnished, ought to have been proportionally attended to. But when it is considered that the hospital had invariably been crowded to excess, with one half, or, more frequently, three fourths of the regiment, it must be admitted that little satisfactory in morbid research could often be obtained. When we consider also, that the officers suffered at least in equal proportion with the soldiers, and that one medical officer had been frequently and severely affected with sickness, in the absence of another with a detachment, once or twice a-week, on stockade attack or duty, and occasionally during three or more successive days,—it will perhaps appear rather surprising that an effort could be made at morbid investigation. Yet enough was done to satisfy comparative inquiry with corresponding cases in India; as well as those that subsequently occurred when the force was advancing to the Burman capital.

The remittent of Pegu exhibited morbid appearances closely analogous to those of the Indian Delta. The effects of cranial determination were sometimes most evident, in the highly turgid state of the vessels of the brain, with occasional deposition of lymph or pus on some parts of the membranes, which were thickened and altered. Serous effusion in the ventricles,

and the base of the brain, had also been much observed. The colour of the liver was often much altered, and so much distended and gorged with blood, as scarcely to bear handling or pressure. The gall-bladder was occasionally nearly empty, containing only a small quantity of light-coloured bile. It was in other cases much enlarged; and discharged, when cut, a viscid, thick and dark substance, resembling tar in colour and consistence. The other organs or viscera evinced little or no trace of diseased action.

The more frequent disorganization of the liver, in alluvian India, or Burman remittents, affords a contrast to what I have observed in jungle or hill affections, similar in violence or progressive development. The fevers of the pestilential jungle of Wynaad, occasionally evinced deleterious miasmal influence, to as concentrated an extent as the endemic of the west: yet the spleen most frequently suffered, while the liver was generally uninjured. The spleen, in the majority of these cases, was enlarged to twice or thrice its ordinary size, and readily yielded to the slightest pressure. It resembled internally a mass of dark broken down coagulum. But a few of the worst Wynaad cases that I have seen, were attended with deep yellowness of the skin, a similar suffusion of the eyes, and generally with excessive vomiting of dark matter. And though it terminated fatally in four or five days, the traces of local injury, or approach to disorganization, was so trifling as to excite the greatest astonishment, that death should have so rapidly occur-

red, without affording grounds for pathological conclusion as to the cause.

The treatment, necessarily vigorous, to obviate rapid disorganization, must, even when successful, have greatly debilitated the patient, and rendered him more susceptible of morbific influence. Hence, they who escaped the fatality of fever generally sunk from cholera or dysentery. Rheumatism, it has been remarked, was often attended with much trouble, but with no danger; whereas almost every case of cholera terminated fatally, with melancholy rapidity; while those of dysentery, though more protracted, were equally fatal.

It does not belong to language to describe, or scarcely to imagination to conceive, the horrifying state of a large hospital, thus circumstanced. Crowded to excess with the dead, the dying, and others, screaming with agony, for relief or dissolution. Medicine often abandoned as useless,—the sick almost wholly unprovided with assistance or with servants, —the hospital, perhaps, otherwise destitute, or miserably supplied with cordials, restoratives, or other comforts. The few who escaped, or evinced approach to convalescence, were sent to barracks for change of air, and the assistance of their comrades; and the better to accommodate the inmates of the hospital. But the convalescents were soon re-admitted, sinking under cholera, or attacked with dysentery. And it may, I believe, be truly said, that almost every man who suffered from either, or both—for they were often combined, surrendered himself to despair, and

too fatally sunk under fatal anticipation. The medical officer, instead, at times, of exhibiting medicine, which the patient despairingly refused, vainly suggested resignation and hope. The unfortunate soldier would dictate his will, and then lie down; sometimes, indeed, with a semblance of resignation, but without a ray of hope, and sometimes with the fixed eye and convulsive shudder of despair.

Of cholera, therefore, in Burmah, little else need be said than the sad record of its attack, and of its fatality; if the symptoms did not offer a striking contrast to those that occurred when the regiment lay at Madras, about the beginning of May 1824, for some days previously to its embarkation for Rangoon. In those days of comparative health and plethoric fulness, cholera pervaded the corps, with epidemic violence and great mortality. The man in barrack was as frequently attacked, as his comrade who was exposed to fatigue and insolation.

The complaint, in the latter case, could not readily be distinguished; it having presented symptoms of great cerebral disturbance, and of febrile excitement, previously to the invasion of the spasm of cholera. But this did not in the commencement indicate variety of treatment; as the uncombined cholera of this period evinced, with abdominal spasmodic uneasiness, much vascular and sensorial excitement, calling as urgently for bleeding, as, perhaps, the synocha itself. The speedy appearance of the other symptoms of spasmodic disease afforded little cause for doubt, and little time for remedial effort.

Headache, a quick, and at the commencement

a strong pulse, though shortly sinking into collapse, —violent and diffused spasms, with incessant gastric and alvine evacuations of thin watery fluid, suddenly ejected, and often in larger quantity than the fluid administered, would, in many cases in a few hours, destroy the patient. The inflammatory action in cholera, although at this time evident, was not attended with that state of the blood that occurs in other inflammations. When called on early, I bled largely in every case, and never observed blood with a buffy surface.

During, or soon after the abstraction of blood, some relief from gastric irritability was occasionally experienced, so as to allow the retention of calomel and opium. Time was afforded also for warm-baths, with warm and spiritous fomentations to the scrobiculus, generally the seat of permanent and intense uneasiness. Unremitting friction with the hand, flannel, hot sand-bags, &c. over a great portion of the body, particularly the abdomen, extremities and other spasmed parts, often produced at least partial relief. During the middle and latter periods of the attack, or state of excessive collapse, strong warm punch, with warm aromatic draughts, to as great an extent as the stomach would admit, were alternately given with calomel and opium.

These ingredients were, in this disease, seldom, and, under my administration, never, attended with their usual specific results. They did not cause stimulus, ptyalism or excitement, though given to a startling extent; not in grains, or in drops, but in

spoonfuls, scruples and drachms! This conclusion could be inferred only from the recovered cases, to which I attended with the utmost anxiety, lest stupor, coma or salivation, might eventually destroy the patient.

The frequency and mortality of the complaint became at length so alarming, that the regiment, before quite ready, was ordered to sea, with the hope of being beyond its range. During this short stay at Madras, preparing for the Burman expedition, the deaths may have averaged, chiefly from cholera, seven or eight per day. Such had been the violence, rapidity and frequency of attack, from inflammatory and congestive cholera, and bilious synocha, that I may with truth assert, that, during five or six successive days and nights, I had not experienced one hour's uninterrupted rest or leisure; and, on any day during that period, that my hand had not been unoccupied with the lancet or prescribing pen for several successive hours.

Many appeared to have brought the materies morbi on board, as about 25 of 200 in a transport under my charge, were, during the voyage, attacked with the same kind of cholera. Three of these died, the others became quickly convalescent, notwithstanding the debilitating and other effects of profuse depletion, opium and calomel. The difficulties I encountered on board, during the first few days, were rather appalling. Labouring under sickness myself, of, I thought, sufficient severity to incapacitate me for exertion; and without the assist-

ance, under other circumstances abundantly procurable in India,—all the persons engaged being too largely paid in advance, having deserted at the moment of embarkation. I requested the assistance of such of the troops as could be induced to volunteer for hospital duties,—which, in India, Europeans are seldom or never called on to perform, and to which, they had, therefore, the greatest repugnance. This repugnance became soon in a great measure unsurmountable; from the unfounded dread of infection, caused by the circumstance of three of the men, who appeared for some days to have enjoyed good health having been seized with cholera, while attending the affected. One died, the others with difficulty recovered. Having remained in the sick berth several hours each day, for some successive days, I succeeded in removing these unfounded fears. I did not lose another man during the remainder of the voyage.

This sketch of cholera, occasionally present at Madras, on the Malabar and Coromandel coasts, and through a large portion of the Madras presidency that I have traversed, is the result of as much attentive observation and comparison as I could have exerted. I contemplated this most dreadful scourge, with a mind as much divested of preconceived theory as could have been effected, under the amazing diversity of circumstances that presented themselves. But with all this aptitude for free inquiry, I observed little or nothing for a satisfactory conclusion, except that many, if not most of the alleged excit-

ing causes, had no foundation in fact. It has been said to have occurred most frequently at night, and to have arisen from suppressed perspiration, or a rapid transition from a high to a low temperature:—whereas the reverse as frequently happened. The absence or presence of the sun evinced little influence, as at least an immediate exciting cause—the attacks having been more frequent during the day than the night. Still less could it be said to have arisen from suppressed perspiration, or atmospheric vicissitude; as men who had been several days in barracks, during which time they had not done duty, could have had little occasion for exposure or exertion, that could induce dangerous perspiration, and yet these men were affected to as great an extent as the others.

Exemption was not obtained by age, sex or other personal circumstances. Men, women and children, of any colour, were equally susceptible of its violence. I knew a child who was attacked in a house, while coolly and quietly amusing herself in a large and comfortable room, advantageously exposed to the sea breeze, at the same hour and to an equal degree with her father, who had been absent for hours, and who might have been exposed;—and the sympathy in both during recovery was as remarkable as at the commencement of the complaint.

Indian cholera having been so ably treated of by others, and with such superior research and accuracy as to leave little original for my limited range of inquiry, would, perhaps, not have been entered up-

on, but for the comparative effect with the mortality that occurred in Burmah.

In the epidemic cholera in India, as it affects Europeans in good or tolerable health, the cerebral disturbance, unequal nervous excitement, and consequent reaction, would lead to the inference that the cranial contents received the first shock of the disease,—to which a different mode of action from that in bilious remittents was soon superinduced. The distribution of the nervous energy became unequal and irregular. The muscles became spasmodically affected, and communicated similar irregularity to the blood. Increased determination of blood to the head, and cerebral nervous excitement, must cause corresponding derangement and congestion in other parts; particularly in those with complex vascular structure, and a secreting function. Wherefore it was, that the head, stomach and liver, were so unequally deranged. Yet these organs, even in the most violent cases, seldom exhibited sufficient structural injury, to account for the fatal result.

But in the Burman cholera, tendency to cerebral excitement, increased vascular action, or hepatic congestion, was scarcely ever observed. The vis vitæ was almost immediately and suddenly overwhelmed to such an extent, that reaction could not be excited by medical stimuli; or relief from spasm, by opiates or friction, to any extent. So great was the state of collapse, and progress to dissolution, in the vast majority of these cases, that the patient would appear *in articulo mortis*, almost before he could be

received into the hospital. And if spasm and collapse, did not afford to this scourge its peculiar characteristics, the nosologist may feel at a loss in what class or order to place it.

Although in India, little certain beyond terrestrial exhalation, and a particular state of the atmosphere, could be assigned as the proximate or remote sources of cholera; extreme exhaustion would appear to have been, in Burmah, the immediate cause, to which atmospheric morbific impregnation doubtless afforded specific and fatal action. But we cannot feel at a loss for remote or predisposing causes, when we recur to the sad catalogue of extreme fatigue, incessant exposure, and hitherto unheard of privations, to which the soldiers had been subjected. To these may be added the debilitating effects of the febrile epidemic, which previously pervaded the whole force; and which necessarily produced predisposition to morbid action in them who survived its attack.

Dysentery, of the most irremediable description, next presented itself. It destroyed the greater number of the survivors of the former diseases; and often attacked the comparative few who had been hitherto exempted from illness. We have, in tracing its causes, little occasion to inquire beyond the exposure and fatigue alluded to, and the inanition which the soldier, would, to a certain extent, sometimes endure, rather than partake of the highly unsound provisions at that time supplied. These rations may, therefore, be considered as the principal predisponent causes, as they must have acted on

the intestinal canal, in an inverse ratio to the little nutriment that they afforded. We can, therefore, feel at little loss to account for the low state of general excitement, the accompanying pyrexia, resembling the typhoid type, or what would mark rather the scorbutic taint of the system, as fully developed. This appearance of scurvy, whether primary or secondary, afforded to the disease a peculiar character, in almost every stage of its progress. The turgid, livid and fetid gums, the countenance, whether bloated or sunken, exhibiting depraved habit of body, the ulcerated or blotched legs, &c., with the early incapability for exertion, and great mental depression, afforded a tolerable certainty of the state of the system: and, combined as it was with severe dysentery, rendered it unmanageable and hopeless. It would necessarily seldom admit of depletion, notwithstanding great abdominal uneasiness, with tension, tormina, tenesmus and discharge of blood. Whenever it was tried, death seemed to have been accelerated. It was soon necessary to discontinue mercury; though it may, sometimes, have temporarily relieved: yet. as soon as its proper action appeared, the whole train of scorbutic and dysenteric symptoms often experienced increased exasperation. Our treatment was therefore limited to palliatives, such as fomentations, topical bleeding, mild purgatives, anodynes, blisters, frequent opiate or other enemas, &c. Cholera, in a state of collapse, sometimes appeared in this form of dysentery, and in general quickly terminated the patient's sufferings. A so-

litary case sometimes occurred, in which collapse was successfully resisted by stimuli,—administered, however, rather despairingly, in consequence of pre-existing abdominal irritation, and yet relief was obtained to an unexpected extent. Hence opium, wine and diluted spirits, were occasionally administered in this species of dysentery, and sometimes with decided but too often with illusory benefit.

Mercury having exasperated all the scorbutic and intestinal symptoms, an attempt was made to improve the latter, merely by regimen, and such diet as our situation would afford. Light and nutritious animal and vegetable broths and jellies were given in the most agreeable forms. Vegetables, and the only fruits we could obtain, plantains, pine-apples and limes, were ineffectually tried. The more purely scorbutic symptoms seemed indeed to improve; but the dysentery rapidly advanced to a fatal termination. Death was, however, sometimes suspended, by the exhibition of from ʒvj. to ʒxij of wine per day, with gr. xij. or gr. xvj. of Pulv. Ipecac. ℞. twice or thrice daily; or two pills, every three hours, ex Opii gr. ss. Pulv. Ipecac. Pil. Hydrag. a. gr. ij. M. pro pil. sing. This quantity of blue pill seldom produced mercurial effect, and seemed to have been useful, in this much-wished-for medicine; —it having generally been best adapted for smoothing the passage to the grave,—for of a probable escape the patient had early relinquished the most distant hope.

The symptoms in this scorbuto-dysenteric disease

were, *ab initio*, tolerably well marked; as were their progressive accompaniments, mutual re-action, and consequent exasperation. But it seldom terminated fatally, with the rapidity that characterizes the more purely idiopathic form of Indian dysentery; yet with much more certainty. The speedy tendency to organic lesion that occurred in the one, if not counteracted by profuse bleeding and mercurials, appeared to have been retarded in the other; in which these remedies were inadmissible, from the extraordinary modification generated by scorbutic action. This diathesis, causing more or less prostration of strength, diminished nervous and vascular energy, the remoter, though more certain destruction of the organ or viscus affected may be thus accounted for.

The scorbutic action evinced fatal predominance only in two or three cases; one particularly, in the Tavoy anchorage, in September 1824. The usual symptoms of both diseases were at first in this case distinctly marked. But the gums became in a few days highly fetid, virulently ulcerated, and most malignantly phagedenic. The lips and tongue ,also, were attacked with extraordinary rapidity. The flesh and integuments of the lower jaw, with the contiguous portions of the neck and the tongue, which was enormously swollen and protruded, were soon seized with most destructive sphacelation. This man was one of the comparative few who had previously escaped sickness; and he having been apparently plethoric, though with rather a feeble pulse, was bled *ad deliquium*, on the first day that the complaint assumed

this destructive character; but its violence increased. Acids, opium, bark, wine, antiseptics, &c. in every form, were ineffectually used. He died on the fourth day. The post-mortem appearances did not account for the horrible result. The intestines were very vascular, and distended with flatus. The peritoneum was in a state of incipient lividity; but these circumstances could not have increased the frightful destruction about the mouth. The pharynx, œsophagus and larynx, were unaltered, except in the immediate neighbourhood of morbid action,—where a limited redness seemed to mark the approach to perhaps a line of separation,—if profuse hæmorrhage, and excessive prostration of strength, had not speedily overwhelmed the patient. The corrosive action soon involved skin, muscles, tendons, cartilages, blood-vessels, the periosteum, and to a certain extent, the bones. Three or four teeth, with their alveoli, and part of either maxilla, were, at two periods, almost coughed out, while convulsively expectorating the blackish, broken down, putrid mass, in which distinction of parts could not have been observed.

This affection, resembling so much the ravages of hospital gangrene, would have excited the greatest apprehensions, lest it might have been propagated in the supposed contagious manner of that disease. We were then on board a crowded hospital ship, with men labouring under scorbutic dysentery, cholera and other equally asthenic complaints. But I had long disbelieved in tropical contagion; and had not, in this instance, cause to change my opinion,—the disease having terminated with the life of the man.

Notwithstanding the violence of this case, evidently arising from scorbutic diathesis, dysentery, of this form, did not, in general, proceed with rapidity, although almost invariably fatal. The post-mortem appearances, however, indicated severe disease. The peritoneum lining the abdominal cavity was, in general, highly vascular, and interspersed with dark and livid patches. The liver was sometimes gangrenous, and sometimes exhibited ulceration and deposition of pus. The hepatic organs were, in general, little affected; they did not evince, at least, primary disease. The spleen was sometimes enlarged, and morbidly soft. The stomach and duodenum were little altered; except the peritoneal coat, which presented appearances similar to the abdominal parietes.

The intestines exhibited, most severely, the onus of the disease. They were in many places thickened and contracted, nearly from the duodenum to the rectum; and in others so thin and distended as to be ruptured by the slightest handling. The greater portion of their peritoneal coat was livid and gangrenous. Sphacelus extended at many points through all their coats. Ulceration in other places admitted the feces into the abdominal cavity. The mucous membrane of the jejunum, ilium and large intestines, were much abraded from the points of ulceration; and were sometimes covered with coagulable lymph, so little organized as not to bear the slightest pressure or distention. It was surprising that intestines, thus disorganized, could have so long endured peristaltic motion. The feces exhibited much diversity of

colour, consistence and odour. The colour alternated between a yellow, dark greenish and lateritious brown. They were generally thin and abundant; and sometimes contained an unusual quantity of shreds of abraded membrane, but never scybala. The odour was always extremely fetid. Large quantities of pus, mucus and blood, were occasionally passed during the later stages; and often appeared in the intestines in a separate state.

Convalescence was always tedious. Relapses sometimes occurred even from the eating of a plantain or pine-apple. In cases of occasional relapse, and ultimate recovery, the complaint gradually assumed the state of chronic diarrhœa; with evacuations occasionally frequent, somewhat abundant and uniform, without blood or mucus. The scorbutic symptoms first subsided. The gums became healthy,—the cuticular affection gradually disappeared,—while a renovated state of mental sensation indicated approach to elasticity and vigour.

Such was the general character of disease that pervaded, for the first few months, nearly the whole of our force in the Pegu Delta and province of Lower Siam. But affairs improved towards the termination of the monsoon. Better and more varied supplies of all the necessaries of life were obtained. The weather having become dry, pleasant and cool, greatly contributed to the improvement of our health; and enabled the force, with little comparative illness, to undergo incessant military operations, from November 1824 till the succeeding January;—required

by the imposing attitude and immense force of the Burmans who collected about Rangoon, as they flattered themselves, for our extermination.

Having dispersed these barbarous hordes, we commenced, on the 16th February 1825, the long projected advance towards the interior. Our progress was necessarily slow; as the two divisions of our force, the one by land and the other by water, were occasionally obliged to communicate. The great obstacles to the advance of the water column occasioned much sickness. It originated from new circumstances, and assumed a somewhat diversified appearance. We were confined for weeks in boats, without bedding or adequate protection from heavy and chilling dews, and a scorching sun; and were generally so crowded that the whole superficies could not afford more than two feet and a half by one to each man. But the subordinate staff, the commissaries and their clerks, pilot-lads and lead-boys, &c., were provided in decked boats, with commodious cabins, and other comfortable accommodation; and, during all this time, a boat could not be had for the sick and wounded, without difficulty and delay. Having been the only medical officer in advance, for a great part of this floating expedition, I was obliged, if possible, to attend to soldiers, sailors, blacks, &c., as they required my assistance, in the boats in which they were originally crowded, as often as I could procure means to visit them. A case of cholera was reported from a distant boat, but a mode of conveyance could not, for hours, be had, till the man was inca-

pable of taking medicine. A vessel was provided for hospital purposes when we had far advanced on the voyage, but it was capable of receiving only a few of the worst cases.

We were now advanced on Prome, and all hearts were elated with the hope of again encountering the enemy. Sickness generally declined with improved diet and favourable weather, during the N.E. monsoon. On the return, however, of the wet monsoon, soon after the capture of Prome by our troops, in April 1825, sickness re-commenced with violence and frequency: but not so fatally as in Lower Pegu. The troops, during the rainy season, were little called on for exertion, and were therefore comparatively healthy. The country about this time began to afford abundance of fresh provisions: beef, poultry, and vegetables were immediately obtained, in consequence of a freer intercourse with the natives. The general state of the force, with respect to comfort and equipment, was so much improved, that the troops confidently anticipated the result of the expected renewal of hostilities; notwithstanding our amazing numerical inferiority to the Burmans, who were collected about us in immense hordes.

Military operations were recommenced by the European forces on the 1st December 1825, and continued, with triumphant success, till the 6th, after which an enemy could not be found till early in the following January. We arrived at Pantanagow, after a forced and harassing march of about 300 miles. During the first days of success, much exposure, hard-

ship and privation, were endured without sickness. The tents and baggage, during these operations, were not suffered to accompany the force. Every man bivouacked where he pleased; some on high ground, surrounded by swamps, and exposed at night to unusual cold,—others on ground less elevated, but not dry,—and all exposed to nocturnal fogs, sufficiently chilling and dense, to wet thoroughly. The thermometer ranged at this time from 50° or 60° during the night, to upwards of 100° at noon. All this was, however, for some time endured, with, I believe, general exemption from sickness;—the effect, doubtless, of excitation and triumph, previously and generally felt. But excitement, no longer supported by the presence of an enemy, soon sunk into debility; which was much aggravated by intoxication, irregularity and the distribution of rations. An ample field was thus afforded for the exertion of powerful morbific agency, that necessarily arose from extreme and rapid atmospheric vicissitude, with great miasmal impregnation.

After our first movement, a halt for two or three days was necessary, for the arrival of the baggage and war materiel from Prome. Ground for encampment was selected; and, with extraordinary infelicity, the tents were pitched on a low flat, with a slimy half-wet surface, and strowed with rice-straw in a state of decomposition. Numerous fissures were in a few days formed in the ground by the heat of the sun, and appeared to be channels for poisonous exhalations. The surface, in consequence of continued rain, became generally miry; and was in many places

covered with water. Cholera, of the old character, again renewed its ravages; and surpassed, if possible, the former visitation, in the fatal rapidity of its collapse. Twenty or more were daily sent to Prome, about twelve miles distant, as the proposed rapidity of the pursuit would have admitted as little incumbrance as possible. Some died on the way,—others while being put on the miserable dhoolies * or conveyances; and all, or the great majority, sooner or later. Another halting place was differently circumstanced, but not less productive of another kind of sickness. The tents and tent-flags were placed on the declivities of very elevated ground, but so near their base as to be fixed in the soft ooze, formed by the springs or water descending from these hills to an extensive swamp within 40 or 50 yards of the camp; and abundantly exhibiting all the materials for highly concentrated pestilential miasm. Cholera had now nearly subsided, or perhaps rather exhausted itself by the destruction of its victims. It was succeeded by remittent fever, to such an extent that it was necessary to carry upwards of 150 of the regiment by every possible conveyance; on gun-carriages, carts, boats, &c. The number of dhoolies allowed on this occasion to the 89th regiment, may, perhaps, have been ten or twelve! and some of these were so unserviceable that they broke, and precipitated the unfor-

* The usual conveyance for sick on a march in India;—where, at least in the Madras presidency, they were liberally furnished, and so well equipped as to afford as much comfort as palanquins.

tunate soldiers, who were suffering under complicated injury or disease. Death sometimes ensued from repetition of falls and exposure to the sun.

The force at length reached Patanagone, on the east bank of the Iriwaddy, opposite, and in a great measure commanding, the extensive fortifications of Mallown. A treaty was immediately entered upon, and during the time employed in its discussion and expected ratification, fever prevailed to as great an extent as on the former occasion;—in many cases with excessive violence, and in all with much irregularity and variety. The more violent remittent appeared to have been the effect of jungle effluvia or impregnation, while those nearest the swamp generally assumed the intermittent type.

About one half of the officers, and more than 200 of 300 men with whom we commenced our march, were severely affected. Two of the officers soon sunk; the recovery of the others was extremely slow, and evinced a disposition to frequent relapse. So great had been the mortality, that the battalion, when proceeding to Pagham Mew, after the capture of Mallown, could muster, of nearly 1300 of whom it originally consisted, only three or four subaltern officers, and about eighty effective men.

The treatment of these jungle fevers deviated little from the practice in the alluvian remittents of the low countries. But as sensorial disturbance and general excitement appeared in many cases likely to lead to more rapid disorganization, temporal arteriotomy was more frequently practised, even as a sub-

stitute for leeches, which could not be procured. It was generally attended with more rapid diminution of high vascular action than venesection. The violence, also, of cranial determination yielded more satisfactorily, when it could be fully and promptly performed. But though we could not, in consequence of bad lancets, and other unavoidable causes, sometimes deplete by this means to the desirable extent, it always evinced effects superior to any other mode of topical abstraction, that could have been attempted. When free depletion and purgatives sufficiently prepared the system for mercurial action, it was practised as speedily as possible, and with the best effects. The fever soon occasionally intermitted or subsided, when cinchona was successfully administered. But so great had been the consumption of this article, that an adequate supply could not always be obtained. In this unfortunate predicament convalescence was retarded or prevented.

The facilities of conveyance by water having been much improved, and as the troops were preparing for a further and last advance, the worst cases of illness were sent to Prome; while the less serious and convalescent were brought up the river, with the portion of the force proceeding by that route. Most of the cases that had been removed soon assumed a change of type, with every promise of increasing amelioration; except those who had previously laboured under obstinate functional derangement, or incipient disorganization of some viscus. For these, hope could not be entertained, from any change of scene, or any circumstances or treatment

The contest now began to terminate; and the progress of the force much further up the country at length ceased;—the enemy having acceded to propositions which had been previously discussed, with more subterfuge than intention of acquiescence, till convinced of the necessity of compliance by repeated signal defeats, and by our near approach to his capital.

Of the more dreadful mortality in Aracan I could not obtain satisfactory information. My services in the Burman empire had been confined to the provinces of Pegu, Lower Siam and Ava. Appalling and almost incredible as our losses had been, in the first and last of these countries, I had reason to believe that they were, if possible, greater among that portion of our army serving in Arracan: although at the commencement, the troops there had, it is said, been better supplied,—and had, at least for some time, been in a great measure exempted from the diseases with which we had been so rapidly and so fatally assailed.

At Tavoy and at Mergui, the principal places of Lower Siam to which my regiment was dispatched, for some weeks previously to our march towards the Burman capital, we experienced a fortunate and unexpected change of diet and other circumstances;—so different from what we had, a short time previously, been accustomed to at Rangoon, that the most beneficial consequences ensued. Disease now began to confine itself to chronic or relapsed cases of scorbutic dysentery, or to cases of intermittent fever, which had been allowed to accompany the expedition,—chiefly

with the hope of being benefited by the voyage and change of scene. This expectation had in some measure been realized; as cases hitherto hopeless soon evinced a greater disposition to yield to medicine and regimen.

Tavoy, that surrendered on our approach, afforded abundant supplies of poultry, fish, fowl, beef and pork, and a great variety of fruits and vegetables;—to all of which we had for weeks been unaccustomed. A gratifying familiarity was soon established with the natives,—a mixed race of the old Siamese and their Burman conquerors, who freely supplied us with the produce of their farms, and often for inadequate compensation. The climate, though within thirteen degrees of the equator, is much superior to that of Rangoon, Calcutta or Madras, and may be said to resemble, or even to excel, the general temperature of the Malabar coast. The heat, although so much to the southward, was by no means so great as in the last mentioned places;—the thermometer ranging in September from 70° to 86°:—nor could atmospheric vicissitude be at any time observed to a sudden and considerable extent. The general aspect of the country was rather wild and uncultivated; but many places were beautifully romantic and diversified.

Such may serve as a general view of part of the interior: but the approach to the town by water, or what was called its anchorage, a space of about thirty miles, was much the reverse. The town and neighbourhood was delightful and healthy; while the anchorage was surrounded by an amphitheatre of highly

pointed hills, that suddenly terminated in abrupt and swampy valleys, all thickly covered with wood and jungle. There were only a few roods of level but miry ground between the river and the hills. The exhalation was necessarily in a high degree miasmal, and so loaded was the morning atmosphere with dense vapour, that the sun's rays were for hours inadequate to clear it. The channel not admitting larger ships to pass to the town, all the sick were ordered on board the transport under my charge. And although a delay of three weeks occurred in this unpromising situation, the deaths were comparatively few, and the admissions were generally of the old and relapsed cases. As arrangements were in progress for the permanent occupation of this and other districts, the troops continued to derive the fullest benefit, from the ample comfort and gratifying variety of accommodation, unexpectedly provided.

With renovated health and high spirits, they proceeded to Mergui, the next point of attack, but by no means so easy a conquest. This town presents as pleasing and diversified a landscape as can well be imagined, and is about one degree nearer the Line than Tavoy. Although nearly open to the sea, it is protected from its violence by an archipelago of islands, which extend along the coast, and form capacious channels to the anchorage of Mergui, situated at the mouth of the Tenasserim river. The anchorage and the town, further protected by other neighbouring islands, exhibit a highly picturesque and romantic view:—and the place was admirably suited for the

convalescent establishment, formed soon after its capture. Its position was so elevated as scarcely to admit of miasmal formation: and having afforded abundant and permanent supplies of every necessary of life, it was better adapted for the reception of cases of chronic illness or of casualty, that did not require to have been invalided; but which may have required advantageous removal from the immediate neighbourhood of military operations.

CASE

OF

ANEURISM OF THE AORTA,

TERMINATING BY RUPTURE INTO THE ŒSOPHAGUS.

By Archibald Inglis, M. D., F. R. C. of Surgeons.

Mrs Nicholson, aged forty-six, naturally of a robust constitution, but having had a large family, and having suffered much from mental anxiety, became a patient of the New Town Dispensary, on the 25th July 1827. Her chief complaints at this period were a very troublesome and almost constant cough, considerable difficulty of breathing, felt especially during the night, and occasional difficulty in swallowing solid food.

The cough occurred in frequent and violent paroxysms, often of very long duration, leaving her but short intervals of repose; it was unaccompanied by expectoration. The dyspnœa at this time was not very perceptible during the day, except when she spoke, at which time the inspirations were

accompanied by a wheezing noise, while her voice was hoarse, and frequently interrupted, to take in a fresh inspiration. The difficulty of swallowing was only occasional, and chiefly confined to articles of solid food, on attempting to swallow which, she felt a sensation of something rising in her throat, together with a feeling of suffocation. Her nights were almost sleepless, both from the dyspnœa, and from a sensation in her head, which she could not well describe, but which came on soon after lying down, and was accompanied by a ringing noise in her ears. Pulse regular, and of natural strength and frequency. The menstrual discharge had ceased five months before. Other functions natural.

Her complaints commenced some months before this period, accompanied by dyspeptic symptoms. She had felt occasional palpitations at the heart, which had not, however, recurred for some time. Had been also affected with tenia, which was removed by appropriate treatment. The cough and dyspnœa had been gradually getting worse.

From this time until her death, her complaints continued, varying only in intensity, but not in nature. The cough remained constant, and almost always without expectoration. The dyspnœa suffered occasional remissions. She was never again annoyed by palpitations, but frequently felt pains in the chest, sometimes in the breast, sometimes in the left side, more rarely in the right, but, most of all, a gnawing pain of the back, between the shoulders. These pains were generally removed or alle-

viated by blisters. The difficulty of swallowing gradually increased, and was now described as a feeling of permanent constriction in the gullet. All solid food was rejected sooner or later after being taken, and seemed never to reach the stomach. About three weeks before death, a small quantity of blood was spit up, but whether from the lungs or stomach, could not at the time be ascertained, as the violence of the cough frequently produced vomiting. She had occasional irregularities of the bowels, and again passed a considerable portion of tenia. The pulse rarely exceeded the natural frequency, and was generally feeble, never irregular.

At length, having gone to bed on the 10th December rather better than usual, she awoke about an hour afterwards, with a loud scream, and spit up a mouthful of blood; her friends ran to her assistance, when she said she felt herself dying, and took leave of them: after this she talked incoherently, and was violently convulsed, according to their account; becoming gradually weaker, she died in about half an hour from the time of her awaking.

The dissection was performed in presence of Mr Brown, about sixty hours after death. Putrefaction had already made some progress. A small quantity of water, deeply tinged with blood, was found in each pleura, and in the pericardium. The lungs were healthy. The heart was of a natural size, and covered with a good deal of fat; its muscular parietes were thin, very soft, and of a colour

resembling putrid flesh. The lining membrane of its cavities was of a dark red colour; the valves healthy, but very thin and transparent. All the cavities of the heart, as well as the vena cava, were empty of blood. The aorta between the heart and origin of the arteria innominata, was dilated to nearly double its usual diameter, contracting again at the origin of that vessel. This dilatation contained no coagula nor fibrinous matter. About an inch beyond the origin of the left subclavian artery, where the aorta did not exceed its natural size, an irregular circular opening, of half an inch diameter, communicated with a cavity, formed apparently in the cellular substance, between the trachea, œsophagus, spine, and aorta. This cavity, which would have contained a large walnut, was partially filled with a dense fibrinous deposite, of variable thickness. Another opening, of larger size, and of more ragged edges, led from the sac into the œsophagus.

The interior surface of the aorta, from its origin to some distance below the unnatural aperture, presented various appearances, forming, in some places, pits or depressions, as if from the absorption of the middle coat, and slight protrusion of the internal one; in others, elevations from the deposition of a yellowish steatomatous matter between these coats, while the intermediate spaces were clouded with various colours, purple, red, and white. The internal coat seemed to pass over the edges of the opening, so as to render them smooth and rounded, but were immediately lost on entering the sac. On

tracing the œsophagus downwards, the first thing that presented itself was a detached portion of fibrinous matter, similar to that contained in the sac, but of greater thickness, and denser structure, corresponding in size and form to the opening in the œsophagus; on one side smooth and concave, on the other rough, convex, and of a brownish colour. Immediately below this, commenced a coagulum of dark coloured blood, filling the rest of the œsophagus, and the whole of the stomach, distending the latter to an unnatural size. Much watery fluid ran out from the duodenum, when cut across; but the intestines were not farther examined. The trachea had suffered no apparent alteration by its contact with the sac. The head was not examined.

The above case appears interesting in several points of view.

1. It presents an example of a rare termination of aneurism of the aorta. The number of similar cases on record being very small, compared to those in which the rupture has taken place into the trachea, or externally.

2. It presents, in the same vessel, examples of the two kinds of aneurism, formerly denominated True and False. In the portion of the artery between the heart and the origin of the great vessels, the three tunics, partaking all equally of the dilatation, and throughout the whole circumference of the vessel, forming the true aneurism; while, in the formation of the other sac, the middle and internal coats had no share, and even the outer had disap-

peared or become blended with the surrounding parts. It is true that the internal coat seemed to enter a little way into the sac; but, as the aperture in this coat, when first formed, must have been much smaller, it is obvious that, as the sac became larger, the current of blood into it would cause the thin internal membrane to fold over the edges of the opening. This tendency would be still farther favoured by the partial destruction of the middle coat, exemplified in the depressions observed in other parts of the internal surface of the artery, which seems, with much reason, to be considered the first step towards the formation of an aneurism of this sort *.

3. This case presents a variety of morbid appearances in the lining membrane of the heart and aorta, which, by some authors, have been considered as the effects of inflammation of those parts. The softening of the muscular substance of the heart might be owing to the degree of putrefaction which the body had attained; but we cannot ascribe to this cause the deep red colour of the inner membrane of the heart, and part of the aorta; nor could it have arisen, as has been supposed in similar cases, from the contact of the blood after death; for here all these cavities were empty. In addition to this, the large and the smaller dilatations, arising from the diminished elasticity and resistance of the coats, the

* M. Bertin says, "Ces dilatations partielles sont le premier degré d'un aneurisme par rupture qui finit par se *greffer* en quelque sort sur l'artére dilatée.

steatomatous depositions, and the ulceration, if it may be so called, in the point where the lower aneurism commenced, would all be considered as confirming the above opinion. We should, however, have expected that the existence of such an inflammation would have been indicated by some symptoms during life; and especially by some marked alteration in the state of the pulse, and of the action of the heart. But, on the contrary, we find that, in the latter part of her life at least, there were no symptoms, but such as might be accounted for by the pressure of the aneurism on the surrounding organs, and the irritation thereby produced. The symptoms of *aortitis*, therefore, if they existed at all, must have been previous to my seeing her; nor could they have been very prominent, or they would not have escaped the observation of Mr Brown, who attended her before.

4. The last remark I have to make, is on the danger that might have resulted, in this case, from the introduction of any instrument into the œsophagus, with a view to ascertain the nature or situation of the obstruction. This mode of examination, which very naturally suggested itself during the life of the patient, but was fortunately not put in execution, by detaching the plug of fibrinous matter which filled up the aperture in the œsophagus, would have obviously led to fatal consequences.

CASE

OF

EXTRA UTERINE FŒTATION,

CONNECTED WITH

RETROVERSIO UTERI.

By Dr WILLIAM YOUNG.

MRS WATT, æt. 33. Has been married two years and a half, has enjoyed good health, particularly during the last two months (November and December 1827). She has never been pregnant.

I first saw her on the 6th of January 1828, when she had a slight discharge of blood from the uterus, unattended with pain. The os uteri, on examination, would not admit the point of the finger. She considered herself nearly two months pregnant; and had not menstruated since the 8th November last. This discharge occurred at intervals, but never to a great extent.

On the 31st of January, when out walking, she was seized with acute pain in the hypogastrium, extending to each side, which she described as "the

turning of knives in the part;" the pain continued without intermission for two hours.

She had a similar attack on the 2d of February, which continued for the same length of time. She had occasional attacks afterwards, but particularly severe on the 16th, which continued nine hours. At this period there was no discharge from the uterus.

From the 16th she continued almost free from pain till the beginning of March, when a hard circumscribed tumour, the size of a small orange, was first perceived in the right iliac region, attended with great pain, increased on pressure: twelve leeches were applied, which gave complete relief; but the pain returned four days after, and was again removed by leeches.

At this period (4th March) an enlargement of the uterus was distinctly perceptible above the pubes, apparently unconnected with the tumour in the iliac region. I found it also enlarged on examination per vaginam.

On the 12th (March) she was seized with pain in the hypogastrium, so violent that her cries were heard at a considerable distance; the pulse was 140 in a minute, and feeble; hiccough; countenance anxious; thirst urgent; the hiccough continued without intermission for two days. The pain continued with little abatement for fifty-six hours, but was ultimately relieved by large doses of opium, by the mouth and by clyster.

On the 14th, she was attacked with severe pain

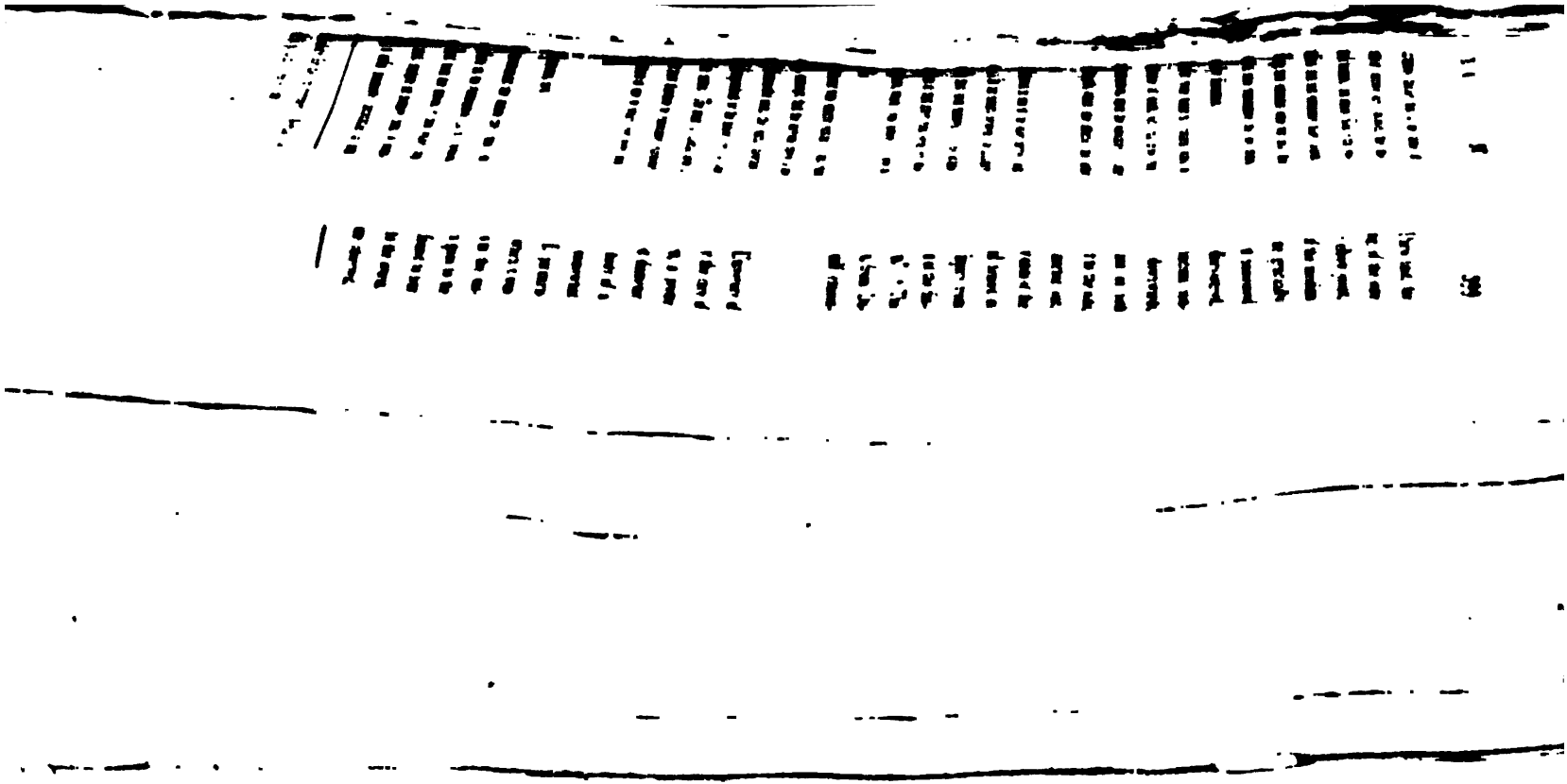
in the lumbar region on each side of the spine, which was effectually removed by cupping, and never afterwards returned.

From the 13th to the 15th of March, the bowels were very obstinate, and could with great difficulty be acted on, even by the strongest purgatives; they were ultimately moved by large doses of croton oil. There is reason to believe this obstinate state of the bowels was chiefly occasioned by the opium given to alleviate the pain.

The os uteri, at this period, could with difficulty be reached, being high up and towards the pubes; the enlarged fundus had fallen backwards, pressing on the rectum so firmly, that the introduction of a flexible clyster-pipe gave great pain; she had no bearing-down pain, but a difficulty in passing her urine.

Dr Thatcher saw her on the 15th March, and coincided with me in thinking that the case was one of retroversion of the uterus. Gentle efforts having failed to move the uterus from its retroverted position, the Doctor introduced a flexible catheter into the uterus, with the view of inducing abortion, as the case now appeared hopeless. Nothing followed the introduction of the catheter till the 18th, when two substances, each about the size of a pigeon's egg, were discharged without pain: they had a dirty white colour, and resembled in their texture and consistence healthy lung.

The difficulty of passing her urine continued to increase till the 18th when it was necessary to in-



discharge took place from the bowels, the appearance of which it is difficult to describe, but bearing some resemblance to pus, mixed with the contents of the intestines, and with detached portions of gelatinous substances. Each of these portions was tinged with blood; the smell was very offensive: when allowed to stand for a few seconds it was covered with a watery fluid, slightly tinged with blood; and when a little of it was put into water it quickly fell to the bottom. This discharge from the rectum continued more or less till the second week of May. For the first eight or ten days from the period when it first made its appearance, the patient was obliged to evacuate the rectum from twelve to twenty times in the twenty-four hours. At times nothing passed but pure blood. After the middle of April, the period when the discharge from the rectum commenced, the abdomen gradually lessened in bulk; and, on the 12th of May, the enlargement in the uterus and in each iliac region was no longer perceptible, and she could bear pressure on any part without pain. The pulse was now reduced to 90 in a minute.

On the 6th May there was discharged by the rectum the fore-arm and hand of a fetus, the soft parts quite putrid. From the size of the arm the fetus appeared to have reached the fourteenth or sixteenth week. From this period, and during part of the following month, small bones continued to be passed per rectum, amounting to about forty, consisting of those of the arms, legs, spine, ribs, &c. &c.

From the middle of May she rapidly recovered; and in four or five weeks was able to take exercise in the open air.

The catamenia appeared, for the first time, towards the end of June, and have occurred regularly since. Some bones were discharged so late as the end of December, and one even on the 4th of May 1829, at the distance of about a year from the discharge of the first. On these occasions pain was felt in the abdominal region, and sometimes also in the right groin, the day before.

I have thus given a faithful detail of the progress of the case, and shall leave it to others to account for the symptoms.

Could the extra uterine fetus occasion the tumour in the right iliac region?

With regard to the retroversion of the uterus, there cannot be a doubt that this did exist, and there is no more difficulty in accounting for it in this case than when it occurs in an ordinary case of pregnancy, the uterus being in many instances proportionally large in extra uterine pregnancy, at least during the first months. Dr Bailie, in the 77th vol. of the Phil. Trans., notices a preparation, where the uterus in a case of tubal pregnancy, was double its natural size.

I had an opportunity some years since of examining the body of a woman who was said to have died of enteritis, where the uterus was nearly as large as in natural pregnancy at the fourth month. The

fetus was floating loose in the cavity of the abdomen, and the placenta attached to the intestines and mesentery, very different in appearance from a uterine placenta; in this case there was no fleshy substance, but only the ramification of a great number of vessels on these organs. The abdomen was filled with putrid serum.

ON THE

DELETERIOUS EFFECTS

OF THE

SMOKE OF COAL,

AS ILLUSTRATED IN THE CASES OF SIX INDIVIDUALS SUBJECTED TO ITS INFLUENCE.

By JOHN GAIRDNER, M. D. Fellow of the Royal College of Surgeons.

I WAS called, on the 14th January last, to see a tradesman's family in my immediate neighbourhood, who were all labouring under an unusual train of symptoms, produced by breathing coal-smoke. The family consisted of a father and mother, who slept in one apartment, and of four grown girls, who occupied an adjoining one. There was a fire in the room in which the daughters slept, but none in the other apartment. The fire burned all night, and was alive and ventilating perfectly when the family awakened in the morning; and it appears that the draught occasioned by this fire had produced a current down the chimney of the other room, as the smoke was observed to issue copiously from that chimney. The doors of both the apartments being

open all night, the smoke passed freely into both of them, and into the lobby between them, but did not find its way into another room, the door of which was shut, and which was situate to the front of the house, while the two first mentioned were to the back. In this front room another person slept, who was the only individual in the house that escaped the deleterious effects of the smoke.

At five o'clock in the morning the mother awaked, and immediately felt a sense of giddiness, and of something disagreeable in the air of her room. She was not, however, at all alarmed, and she felt an almost invincible reluctance to rise, to which she yielded, and again fell asleep. She was awaked at seven by one of her daughters, who had been roused by the same feelings, and who appears to have been greatly alarmed by the sensation of excessive giddiness which she felt, and by the denseness and cloudiness of the air of the room. It is remarkable enough that neither she, nor any of the family, so far as I could learn, appear to have experienced any sense of suffocation, or disposition to cough. On getting up, she was immediately seized with very severe headach, which she had not felt till then; and soon after she had a violent fit of vomiting. Besides these symptoms, there was a degree of stupefaction, which she herself described by saying that she scarcely knew what she was doing. Notwithstanding this she was strongly excited and alarmed, and being desirous to know whether the appearance of her face was altered, she ran to a mirror; but

when she got to it, she quite forgot the object for which she went, and stood for some time before it in a state of stupid vacancy of mind. Her stupor, however, was not so great as to prevent her from rousing the whole family. Immediately after they were waked up, her three sisters were successively seized with the same symptoms. All felt the same disinclination to rise, all had on rising the same giddiness, and, soon after, the same severe headach and vomiting, and all had more or less of the same stupefaction. The matter they vomited was excessively bitter, at first green, and afterwards yellow. The father and mother were similarly, but much less severely, affected. They did not vomit, but were very sick and giddy, and could eat nothing all day. The girls continued to vomit occasionally during a great part of the forenoon; and for several hours the fits of vomiting occurred once in ten minutes or a quarter of an hour.

Soon after first taking alarm they opened the windows and doors as wide as possible, and, in compliance with some judicious advice which they received at a laboratory, put on large fires in both the rooms to promote ventilation. They did not send to me till between ten and eleven o'clock, and it was past eleven before I saw them. By this time two of the girls were so much better as to be able to sit up. The other two were in bed, and still very liable to fits of vomiting, though these did not recur so often as at first. They seemed to have much lassitude, and disposition to lie in bed. The pulse was calm in all

of them, and there was a slight redness and puffy swelling under the eyes in them all. There was no appearance about any of them which indicated danger, nor, as I thought, any occasion for any very active treatment. In two of them the vomiting was a little obstinate. I attempted to restrain it by opiates, but without success, the stomach rejecting them almost immediately. After the lapse of a few hours this symptom abated, and Seidlitz draughts, prepared in the usual manner, were retained. The whole family were more or less sick and giddy for the rest of the day, nor had they perfectly regained their appetites the following morning at breakfast. They all recovered perfectly, without fever or diarrhœa, or any other bad consequence.

My friend Dr King, now of Eltham in Kent, has reported, in the 7th volume of the Edinburgh Medical and Surgical Journal (p. 180.), the cases of four individuals, the crew of a vessel, who were exposed in the cabin, during fourteen hours, to an atmosphere strongly tainted by the smoke of a coal fire. There was no vomiting in any of these cases; but it is to be remembered that this symptom did not occur in my patients, till they had been thoroughly roused, and that Dr King's patients had been permitted to lie still, till three of them were so ill as to make it doubtful whether they could possibly be recovered, and the fourth could not be recovered at all. The same unwillingness to move, which I have described, appears to have been present in one of Dr King's patients, the mate of the

vessel, who was partially roused at an early hour in the morning, and who begged at that time that he might not be disturbed. He and the rest were accordingly permitted to lie in bed for several hours longer, under the impression that they were intoxicated; and, when they were at last taken up, the three who were alive had suffused faces, rigid limbs, incurvation of the fingers and toes, feeble pulses, and an impeded respiration, performed with sobs and with a rattling sound. Dr King's cases exemplify the full effect of the coal smoke after long exposure, and mine shew the earlier symptoms produced by it. The two sets of cases taken together will serve to give a tolerable view of the effects of this deleterious agent on the human frame.

I am not aware that the smoke of coal has ever been chemically analysed; but we may venture, I think, to pronounce pretty confidently, that its chief deleterious ingredient is carbonic acid. It may also contain sulphureous acid; and it contains soot in a state of mechanical suspension;—but this last, as well as the ammoniacal gases, which are evolved from the coal, can add little to its noxious properties. As these properties, therefore, depend chiefly on the same principle with those of charcoal vapour, it is probable that coal smoke would be equally often productive of fatal consequences, were it not for its sooty and sulphureous ingredients, which render it distressing to the lungs, the nostrils, and the eyes, and thus prevent the use of coals as fuel in confined situations, in which charcoal can be employed without the same immediate disagreeable sensations.

While upon this subject, I cannot help noticing a very extraordinary statement, contained in the celebrated work of Orfila on poisons. In treating of the gases disengaged during the combustion of charcoal, he says, " On peut considérer ces gaz comme formés de beaucoup de gaz oxide de carbone, et d'un peu de gaz hydrogène carboné. Il est évident qu'ils ne peuvent contenir que des atomes de gaz acide carbonique, car celui-ci est décomposé par le charbon rouge, et transformé en gaz oxide de carbone."—(See Orfila, *Traité des Poisons*, tome ii. partie ii. p. 68.)

Now, it is no doubt true, that red hot charcoal converts carbonic acid into carbonic oxide, but this happens only when the experiment is conducted in a close tube, without access of atmospherical air. Carbonic oxide, and carburetted hydrogen (which latter he also strangely imagines to be contained in the vapour of burning charcoal) are both highly inflammable, and therefore cannot possibly escape unburnt from a charcoal fire, to which the atmosphere has, of course, free access*.

Had Orfila stated his opinion as the result of experiments performed on the vapour of charcoal, I might have hesitated to call it in question; but he rests it simply on theoretical views, and these appear to me, for the reasons above stated, to be untenable.

* Carbonic oxide appears to be highly deleterious.—See Phil. Magazine, vol. xliii. p. 367.

AN ACCOUNT

OF SOME

EXPERIMENTS

ON

DIFFERENT PARTS OF THE HUMAN BODY.

By John Davy, M. D. F. R. S. Physician to the Forces, Corresponding Member of the Society.

In this communication, I shall describe the results of some simple experiments, on different parts of the human body, trusting that they will not be unacceptable to the Society to which I have the honour of submitting them, as devoid of utility in practical application, and as a data for physiological reasoning.

Bichat in his immortal work, his *Anatomie Générale*, has led the way in this method of scrutiny, and has accomplished much by means of it. Should I seldom refer to his pages, the omission will be intentional. It was my wish to enter on the inquiry with no preconceived views, to follow it unbiassed by authority, and to state simple facts, the results of experiments; and, afterwards, should leisure and

opportunities allow me to complete the series of experiments which I have ventured to contemplate, it will be a part of my design to review the facts I may have collected, compare them with those collected by other enquirers, and endeavour to deduce from them the general conclusions, which may be warranted by rigid induction. In the mean time, I shall have no hesitation in pointing out, in passing, any applications of the results which may appear likely to be useful, or in drawing such minor conclusions as do not involve any general doctrines on disputed points.

1. *Of the effects of Desiccation.*

I shall first notice the results of the experiments which I have made on the desiccation of different parts of the body. This is almost necessary as a preliminary, for unless it is known with tolerable accuracy what the quantity of dry solid matter is in each part, other statical results will be vague, and of little value.

The method of desiccation which I have employed was that of a vapour-bath. The parts were either placed on paper, when not likely to adhere, in a Wedgewood evaporating dish, over steam, or suspended over it, almost touching the bottom, by fine thread, when of an adhesive kind; or, when very soft, they were placed in it, in platina capsules previously weighed. They were kept in the bath till all the water they contained was driven off, or till they ceased to suffer any loss from further exposure.

In the following table of the results, Roman numeral figures are employed to designate the subjects from which the parts were procured, and of which some notice will be taken afterwards.

			Per Cent.
1.	i.	Cuticle of sole of foot, by desiccation reduced to	51.5
2.	iii.	Projecting part of nail of thumb, rather curved as in Phthisis,	83.3
3.	—	Inner part, soft, diaphanous, carefully freed from adhering subjacent layer,	76.6
4.	—	Boojesman's,	91.6
5.	—	Hottentot woman's hair,	92.0
6.	—	Kaffer boy's hair,	92.3
7.	—	Young woman's hair of Pitcairn Island,	91.3
8.	—	Light coloured hair of an Englishwoman,	90.7
9.	—	Dark coloured ditto,	90.7
10.	ii.	Skin over belly of deltoid muscle,	32.4
11.	iv.	Ditto over lower part of scapula,	35.3
12.	v.	Ditto from middle of back,	42.3
13.	vi.	Ditto, ditto,	39.5
14.	vii.	Ditto over first joint of thumb,	39.0
15.	—	Ditto of fore-arm, just below its bend,	32.8
16.	—	Ditto of shoulder,	37.4
17.	—	Ditto of scrotum,	30.2
18.	vi.	Cornea,	27.3
19.	—	Sclerotica,	33.3
20.	i.	Fatty matter from beneath integuments of abdomen,	88.9
21.	—	Pectoralis major muscle,	15.6
22.	iii.	Muscular substance of left ventricle of heart,	20.5
23.	—	Pectoralis major muscle,	24.0
24.	v.	Gluteus maximus muscle,	25.8
25.	—	Columnea carnea from left ventricle,	21.2
26.	iii.	Cerebrum (centrum ovale),	33.9
27.	—	Cerebellum,	20.8
28.	—	Medulla oblongata,	31.0

			Per cent.
29.	v.	Sciatic nerve,	28.5
30.	i.	Aorta (inferior abdominal portion),	22.5
31.	iii.	Ditto at its origin,	28.0
22.	v.	Ditto at its origin,	34.5
33.	—	Femoral artery just below the anterior profunda,	31.4
34.	vii.	Ditto, do.	14.4
35.	—	Aorta just below its arch,	31.7
36.	—	Ditto just below the cœliac,	28.2
37.	—	Ditto (its termination),	26.5
38.	—	Common iliac artery,	24.6
39.	ix.	Basilar artery	26.8
40.	—	Arteria sylviana,	31.0
41.	x.	Basilar artery,	34.0
42.	—	Arteria sylviana,	31.4
43.	i.	Ascending vena cava,	27.9
44.	v.	Femoral vein contiguous to anterior profunda,	31.3
45	vii.	Ditto a little lower,	32.3
46.	—	Vena cava ascendens (its commencement),	25.0
47.	—	Superficial vein at bend of fore-arm,	33.3
48.	vi.	Thoracic duct,	29.5
49.	i.	Substance of liver,	22.9
50.	iii.	Ditto,	24.3
51.	v.	Ditto, (Lobula Spigelii),	25.8
52.	viii.	Ditto,	28.5
53.	i.	Substance of spleen,	19.2
54.	iii.	Ditto,	24.3
55.	i.	Substance of kidney,	19.0
56.	iii.	Ditto,	18.4
57.	i.	Substance of lung,	22.2
58.	iii.	Substance of Pancreas,	22.2
59.	iv.	Substance of testicle,	16.3
60.	—	Great arch of stomach,	19.5
61.	—	Upper part of jejunum,	18.6
62.	viii.	Ditto,	11.8
63.	iii.	Dura mater,	32 7
64.	i.	Pericardium (outer layer and a little fatty matter under it detached),	41.0

		Per cent.
65.	i. Perichondrium of cartilage of false rib, .	35.0
66.	iii. Ditto, ...	35.0
67.	vi. Pleura costalis, ...	31.0
68.	ii. Corpus cavernosum penis, . .	22.2
69.	iii. Extensor tendon of great toe, . .	32.2
70.	v. Tendo Achillis, ...	32.0
71.	iv. Intervertebral substance from last lumbar intervertebral space, cut out in the form of a ridge,	26.7
72.	v. Cartilage of knee-joint, . . .	28.0
73.	ii. Cartilage of false rib, . . .	33.7
74.	iii. Ditto, ...	40.0
75.	i. Superior part of sternum (spongy portion) .	57.3
76.	— Ditto, (outer table), .	78.3
77.	v. Shaft of tibia, (outer layer), . .	89.2
78.	— Ditto, (inner layer), . .	88.0
79.	iii. Fibrinous concretion from right side of heart,	23.0
80.	viii. Ditto, from left auricle, . . .	17.5
81.	— Venous blood, of Specific Gravity 1.061 .	20.7
82.	— Serum of blood, of ditto ditto 1.030 .	11.7

I shall now briefly give such particulars of the subjects, from which the parts desiccated were taken, as seem necessary.

i.—Aged twenty-nine years; admitted into hospital 20th May; died 2d June, of inflammation of mucous coat of ileon and colon, ending in gangrene. Dissection seven and a-half hours after death; body slightly emaciated.

ii.—Aged thirty years; admitted into hospital 23d May; died 30th May, of tetanus, following a fracture of inferior extremity of radius, and two transverse processes of lumbar vertebræ. Dissection sixteen hours after death; body very muscular and fat.

iii.—Aged thirty-six years; admitted into hospital 3d May; died 5th June, suddenly, with tubercular phthisis. Dissection three hours after death; body considerably emaciated.

iv.—Aged twenty-two years; admitted into hospital 27th April; died 9th June, of tubercular phthisis, very far advanced and complicated. Dissection seven hours after death; body extremely emaciated.

v.—Aged twenty-three years; admitted into hospital 20th May; died 13th June, from fracture of cranium and cervical vertebræ, and effusion of blood on brain, and softening of spinal chord. Dissection twelve hours after death; body not emaciated.

vi.—Aged twenty-two years; admitted into hospital 1st July; died 4th July suddenly, as if from syncope, whilst labouring under a febrile attack, connected with ulceration of mucous membrane of ileon, and enlargement and softening of mesenteric glands. Dissection eleven hours after death; body not emaciated.

vii.—Aged thirty-two years; admitted into hospital 5th July; died 13th July, with febrile symptoms, connected with a vast latent abscess of the liver. Dissection sixteen hours after death; body not emaciated.

viii.—Aged thirty-three years; admitted into hospital 3d July; died 16th July, of acute dysentery, terminating in gangrene of mucous coat of large intestines, and perforation of colon. Dissec-

tion seventeen hours after death, body slightly emaciated.

ix.—Aged thirty-two years; very stout and muscular; died suddenly in barracks, of pulmonary apoplexy, complicated with cerebral. Dissection fourteen hours after death.

x.—Aged twenty-three years; admitted into hospital 17th July; died 30th July, of inflamed and ulcerated ileon. Dissection twelve hours after death; body considerably emaciated.

With the exception of the parts taken from the body No. 1., all the others, the instant they were dissected out, were gently pressed between folds of blotting-paper, to remove superfluous moisture or adhering fluids; and in an hour, or two at farthest, were placed to dry on a vapour-bath, as already mentioned. In the exception above alluded to, the parts were kept together, covered over, till the following morning, and then they were washed with water, and subjected to pressure with blotting-paper, previous to drying.

It may be right to state, that all the bodies were of British soldiers, and that they all died in Malta; and, as will appear from the dates, during the hot season, which this year has been unusually hot, the thermometer the whole time fluctuating between 80° and 90°.

Of the effects of desiccation on animal textures, I need say very little, as they are pretty generally known, and are such as might be expected *a priori*.

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The brittleness which the operation imparts, and its preventing putrefaction, are two of its most remarkable and general effects. But these effects are only temporary; as soon as humidity is restored, flexibility is also restored, and the tendency to putrefaction and decomposition returns, and apparently unimpaired by suspension. This property of desiccation in animal matter, and in vegetables also, though it has been long applied to economical purposes, for the preservation of articles of food, has not, perhaps, been used so much as it deserves; nor has the principle, I believe, been applied as generally as it might be, to the solution of certain phenomena, strictly chemical, which occur in nature and art. Does it not serve to explain a fact which, on first consideration, seems not a little extraordinary, that meat will remain fresh for many days in Egypt, if hung up in the open air, and exposed to sunshine and wind, in the hottest weather; whilst it putrefies in a few hours, if confined in a close damp place? Does it not afford equally an explanation of the opposite effects in the Mediterranean, on dead animal matter, of the south-east or sirocco wind, and of the north and north-east winds? The former, almost saturated with moisture, produces little or no evaporation or desiccating effect; whilst the latter, deficient in moisture, and sometimes in an extraordinary degree deficient, occasions rapid evaporation, and powerfully desiccates; the one acting like confined moist air in Egypt, and greatly promoting putrefaction; the other operating like the

dry wind of the desert, though in a less degree, and retarding the change*. May it not, too, serve to account for so many remains of ancient Egypt being preserved to the present times, the natural dryness of the climate having been assisted by various processes of art? And is not proof afforded of the correctness of the explanation, in this region being almost the only one thus spared and exempted from the general doom of slow and certain change, almost amounting to destruction, and which is manifest in other countries, where the elements have free play through the intervention of moisture, even in the works of nature?

Looking over the preceding table of results, it is curious to notice what little relation there is between the solidity of a part, indicated by firmness and resistance, and the quantity of solid matter which it yields on desiccation. Who would suppose, *a priori*, that the soft flexible skin contains more of this solid matter than cartilage; or, that the delicate serous membranes contain more than the firm viscera; or (and it is most remarkable) that the liquid blood possesses a larger proportion of it than some of the solids.

The proportional quantity of solid and fluid matter, constituting the animal body, is a question to

* The cooling effect of the wind is one of the simplest and most certain means of knowing its proportional humidity. The cooling effect on a thermometer, the bulb of which is wrapped in moist muslin, of the sirocco wind, varies from 3° to 6°, and of the northerly winds in summer from 12° to 30°.

ing table shews the quantity of solid matter per cent. which each afforded, when dried on a vapour-bath, as in the experiments on desiccation. The increase of weight, when it can be clearly established, may serve to indicate the quantity of combined tannin.

	Per Cent.
1. Skin of thumb, afforded	55.6
2. Cuticle of sole of foot, most of the cutis removed,	53.4
3. Pleura costalis,	83.3
4. Lower part of ileon,	38.5
5. Upper part of jejunum,	34.4
6. Aorta,	52.3
7. Muscular part of diaphragm, neither its peritoneal or pleural lining removed,	55.3
1. Rib, afforded	58.8
2. Cartilage of false rib,	57.0
3. Intervertebral substance,	41.7
4. Dura mater,	53.0
5. Pia mater,	53.4
6. Cellular structure,	69.3
7. Perichondrium of cartilage of false rib,	72.2
8. Cornea,	55.5
9. Sclerotica,	70.0
10. Corpus cavernosum penis,	45.7
11. Medulla oblongata,	43.4
12. Pectoralis major muscle,	36.4
13. Aorta,	47.1
14. Vena cava,	40.2
15. Thoracic duct,	53.5
16. Liver,	27.6
17. Spleen,	28.3
18. Lung,	23.1
19. Kidney,	17.4
20. Pancreas,	16.4
21. Fibrinous concretion from ventricle of heart,	45.6

The first set of experiments was commenced on the 1st November last, at Corfu. The parts employed were from the body of a young man, who died of remittent fever; and they were kept in infusion of catechu till 23d June. The second set of experiments was commenced in Malta, on the 15th April. Most of the parts employed were from the body of a man aged thirty-five years, who died from the effects of a severe injury occasioned by a fall, and they were kept immersed till 4th July.

I have stated, that putrefaction took place in every instance, in a greater or less degree, and that after a time, changing the infusion, it ceased. Some animal matter, too, in each instance, was separated from the part, and deposited. At the same time the infusion of catechu had its strength impaired; some of the catechu appeared to be precipitated in the sediment, a part of it in most instances seemed to combine with the texture, and another part of it rose to the surface, in the form of a thick pellicle, having undergone some change.

The animal parts which seemed to suffer most from putrefaction, were the liver, spleen, pancreas, and kidney. The cuticle was the only part that did not appear to combine in the smallest proportion with tannin, or to be preserved by it. After long immersion in the infusion, it was as it were rotten, the particles of it hardly held together, and were most easily detached, and, when dried, their cohesion was almost entirely destroyed. This, however, strictly applies only to the outer layer, not to

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2. Cuticle of sole of foot, most of the cutis removed,	53.4
3. Pleura costalis,	83.3
4. Lower part of ileon,	38.5
5. Upper part of jejunum,	34.4
6. Aorta,	52.3
7. Muscular part of diaphragm, neither its peritoneal or pleural lining removed,	55.3
1. Rib, afforded	58.8
2. Cartilage of false rib,	57.0
3. Intervertebral substance,	41.7
4. Dura mater,	53.0
5. Pia mater,	53.4
6. Cellular structure,	69.3
7. Perichondrium of cartilage of false rib,	72.2
8. Cornea,	55.5
9. Sclerotica,	70.0
10. Corpus cavernosum penis,	45.7
11. Medulla oblongata,	43.4
12. Pectoralis major muscle,	36.4
13. Aorta,	47.1
14. Vena cava,	40.2
15. Thoracic duct,	53.5
16. Liver,	27.6
17. Spleen,	28.3
18. Lung,	23.1
19. Kidney,	17.4
20. Pancreas,	16.4
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The animal parts which seemed to suffer most from putrefaction, were the liver, spleen, pancreas, and kidney. The cuticle was the only part that did not appear to combine in the smallest proportion with tannin, or to be preserved by it. After long immersion in the infusion, it was as it were rotten, the particles of it hardly held together, and were most easily detached, and, when dried, their cohesion was almost entirely destroyed. This, however, strictly applies only to the outer layer, not to

the inner, and there appeared to be a gradation from it. The nearer it approached the cutis the more coloured it had become and compact, and the more it seemed to partake of the nature of this membrane, when converted into leather. All the other parts were more or less indurated, and rendered more compact and firm, and all of them were more or less coloured. When dried, they were all comparatively rigid, with the exception of the pleura and pia mater. When immersed in water, they imparted to the water a brown colour. The colouring matter thus withdrawn when exposed to the air, was gradually precipitated, and became insoluble like vegetable extractive; and, when burnt, it emitted a mixed fume of vegetable and animal matter,—the former predominating; and, by its abstraction, though the colour of the different textures was very little altered, yet they were all rendered more brittle, even the pleura, when dry, lost almost entirely its flexibility. I tried the effect of water in this manner only on the parts employed in the first set of experiments. The loss each part sustained, per cent., when dried on the vapour-bath, was as follows;—

	Per Cent.
1. Cuticle of sole of foot, afforded	21.8
2. Skin of thumb,	7.3
3. Pleura costalis,	25.0
4. Lower part of ileon,	9.7
5. Upper part of jejunum,	9.0
6. Aorta,	6.0
7. Muscular part of diaphragm,	3.4

The great loss sustained by the cuticle was probably chiefly in consequence of the tannin and colouring matter which it had merely imbibed, when distended by the infusion, like a sponge, being washed out, and from some of its particles having been detached, in consequence of its decayed state already alluded to. None of the parts shewed the least tendency to putrify, during this immersion in water, though the temperature of the air at the time was high, often above 90°, and they were exposed to the air.

Considering all the circumstances of these experiments, the loss of a portion of animal matter from putrefaction *,—the apparently great increase in weight in several instances, and the change of properties produced in all, tending to the preservation of the part, with the exception of the cuticle, I think it may fairly be inferred, that the cutis is not solitary in its power of combining with tannin and forming leather; on the contrary, that the fibrin of the blood, in the form of a fibrinous concretion, or the buffy coat, and that the fibrous and serous textures, and the vessels, including each kind, possess this power in a still more eminent

* I believe the degree of putrefaction and effect produced by it, is in some measure proportional to elevation of temperature, and that this is a principal cause that the leather is so well fitted for the climate in which it is made. Made in a hot climate, it is soft and very porous, allowing heat and perspiration to escape; made in a cold and temperate climate it is strong and dense, excluding moisture and retaining heat.

CASE

OF

EMPHYSEMA,

WITHOUT LOCAL INJURY.

By William Dumbreck, M. D. Fellow of the Royal College of Surgeons, and one of the Medical Officers of the New Town Dispensary.

Jane Wright, æt. 33 months, was seized on Friday the 9th of August 1828, with rigors, sneezing, and the usual precursory symptoms of measles, which were very prevalent in the neighbourhood at the time. On the Tuesday following, the eruption appeared very distinctly over the whole body; but, after two days, began to fade, with considerable increase of the febrile symptoms, much dyspnœa and cough. These were nearly subdued by leeches, sinapisms, the warm bath and laxatives; when, on Sunday, after a severe fit of coughing, the dyspnœa returned. On visiting the child shortly after, I found the breathing much oppressed, the countenance pale and collapsed, the pulse small and rapid,

with great restlessness and disinclination to be in bed; and, at the upper part of the sternum, I found a crepitating tumor, which occupied the anterior part of the neck. Stimulating embrocations, with opiates to relieve the cough, &c. were assiduously employed, but the dyspnœa continued; and, on the following day, the emphysema had extended over the back and chest, and proved fatal two days after.

Dissection.—Externally, the crepitation could be felt distinctly, and the neck and upper part of the thorax presented a puffy appearance. On dividing the skin and cellular membrane, the air could be pressed out from both sides of the incision. The removal of the sternum displayed the cells of, the anterior mediastinum enormously distended with air, especially anterior to, and on each side of, the pericardium; the posterior mediastinum was affected in a lesser degree. The lungs presented a healthy appearance, crepitated on pressure, but not more so than natural, and were not collapsed; the lowest lobe of the right lung adhered strongly to the pleura costalis, and still more so to the diaphragm; part of the upper lobe of the left lung was gorged with blood, and there was some fluid contained in the cavity of that side. The pericardium also contained a small quantity of fluid, and the right auricle was distended with blood. No rupture of the larynx, trachea, or bronchial tubes, could be discovered after a careful examination.

The form of emphysema with which medical men are most familiar, is that arising from the spiculæ

of fractured ribs causing wounds of the lungs, or from small-sword, bayonet, or gunshot wounds, where a free communication between the external air and the cavity of the chest does not exist. In the case which I have given, I have no doubt, from the extent to which the emphysema had spread, that it proceeded from a rupture of some of the air-tubes, caused by the exertion of coughing. An emphysematous swelling has occasionally taken place from the efforts of labour, and also from the bursting of a vomica, which had produced an erosion of the pleura costalis, and a communication between the lungs and cellular membrane under the integuments; but this is a rare termination, as the inflammation which precedes the formation of a vomica generally produces adhesions of the neighbouring parts preventing a communication with the air-cells. Dr Huxham details a case of emphysema, in the third volume of the Medical Observations and Inquiries, occurring during typhus fever, and arising from putridity; but that air should be generated to such an extent in the living body is rather doubtful. Dr Baillie has also given a case in his Morbid Anatomy, of what he calls "Spontaneous Emphysema," in which he thinks the air was secreted by the bloodvessels. Emphysema has been produced from a foreign body lodging in the larynx, when the coughing and retention of the air caused a rupture of the bronchial cells. It has also happened from a rupture of the larynx or trachea, from external injury, and also in operations upon

the neck, of which a well marked case is related by Allan Burns, in his " Surgical Anatomy of the Head and Neck." In the Dictionaire de Science Medicale, a case is mentioned, in every respect similar to the one I have related, but in which a recovery took place after eight days. It happened in a child after a severe fit of coughing, and the emphysema, in the course of twenty-four hours, had extended to the face, neck and trunk. M. Dubois exhibited anodynes and laxatives, and enveloped the body in cloths wet with spirits of wine. From these cases, we find that, from irregular action of the lungs, from a foreign body lodging in the larynx or trachea, or some other internal cause, emphysema may be produced, differing in no respect from that produced by injury of the lungs neither in its symptoms nor terminations.

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The first set of experiments was commenced on the 1st November last, at Corfu. The parts employed were from the body of a young man, who died of remittent fever; and they were kept in infusion of catechu till 23d June. The second set of experiments was commenced in Malta, on the 15th April. Most of the parts employed were from the body of a man aged thirty-five years, who died from the effects of a severe injury occasioned by a fall, and they were kept immersed till 4th July.

I have stated, that putrefaction took place in every instance, in a greater or less degree, and that after a time, changing the infusion, it ceased. Some animal matter, too, in each instance, was separated from the part, and deposited. At the same time the infusion of catechu had its strength impaired; some of the catechu appeared to be precipitated in the sediment, a part of it in most instances seemed to combine with the texture, and another part of it rose to the surface, in the form of a thick pellicle, having undergone some change.

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ture of ergot.* Twenty-five minutes after she had a very strong pain, which was soon followed by another, and which fully dilated the os uteri; the next pain expelled the child.

Recovery good.

CASE II.—Mrs C. Fourth child. Called at eleven, P. M.

The pains recurred every five minutes, but exerted little influence on the os uteri, which was dilated to the size of a crown piece. She continued in this state for an hour and a half, the labour making little or no progress. She stated that she was generally long ill, and that in the last two labours she had remained in a state similar to that in which she now was for twelve or fourteen hours. At half-past twelve gave half a drachm of the ergot, in powder, mixed with water, which was immediately rejected by vomiting. Another half drachm was given, mixed with Sherry wine, which was retained. Half an hour after, the pains became much more effective, and she was delivered at half-past one.

Recovered well.

CASE III.—Mrs S. Third child. Saw her at eleven, A. M.

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* *Tincture of Ergot*—

Spirits, above proof,	-	℥x.
Ergot,	-	℥iij.

The pains were not strong, with a considerable interval between them. The os uteri rather more than one-third dilated, and soft. At half-past twelve administered half a drachm of the ergot in decoction. After waiting half an hour, and finding little change in the character of the pains, gave a similar dose. Soon after, the uterine efforts were frequently repeated, and more powerfully exerted, so that the delivery was completed before 2 o'clock.

Recovery good.

CASE IV.—Mrs B. Fourth child. Saw her first late at night.

The pains were trifling, and the os uteri very little dilated when I left her. She continued almost free from pains till late next day, when they returned, and continued to increase for two hours; the os uteri continued to dilate, but the pains gradually became feebler, and she complained of sense of exhaustion. Administered half a drachm of the powdered ergot in water, which, after waiting half an hour, appeared to produce no effect: the dose was therefore repeated. The pains soon after became strong and effective, and delivery was soon completed.

Recovered without any untoward symptom.

CASE V.—A woman in Dalrymple place, attended by a young gentleman, was said to have been in labour for fourteen hours before I saw her, but the pains had almost left her for several hours

iii.—Aged thirty-six years; admitted into hospital 3d May; died 5th June, suddenly, with tubercular phthisis. Dissection three hours after death; body considerably emaciated.

iv.—Aged twenty-two years; admitted into hospital 27th April; died 9th June, of tubercular phthisis, very far advanced and complicated. Dissection seven hours after death; body extremely emaciated.

v.—Aged twenty-three years; admitted into hospital 20th May; died 13th June, from fracture of cranium and cervical vertebræ, and effusion of blood on brain, and softening of spinal chord. Dissection twelve hours after death; body not emaciated.

vi.—Aged twenty-two years; admitted into hospital 1st July; died 4th July suddenly, as if from syncope, whilst labouring under a febrile attack, connected with ulceration of mucous membrane of ileon, and enlargement and softening of mesenteric glands. Dissection eleven hours after death; body not emaciated.

vii.—Aged thirty-two years; admitted into hospital 5th July; died 13th July, with febrile symptoms, connected with a vast latent abscess of the liver. Dissection sixteen hours after death; body not emaciated.

viii.—Aged thirty-three years; admitted into hospital 3d July; died 16th July, of acute dysentery, terminating in gangrene of mucous coat of large intestines, and perforation of colon. Dissec-

tion seventeen hours after death, body slightly emaciated.

ix.—Aged thirty-two years; very stout and muscular; died suddenly in barracks, of pulmonary apoplexy, complicated with cerebral. Dissection fourteen hours after death.

x.—Aged twenty-three years; admitted into hospital 17th July; died 30th July, of inflamed and ulcerated ileon. Dissection twelve hours after death; body considerably emaciated.

With the exception of the parts taken from the body No. 1., all the others, the instant they were dissected out, were gently pressed between folds of blotting-paper, to remove superfluous moisture or adhering fluids; and in an hour, or two at farthest, were placed to dry on a vapour-bath, as already mentioned. In the exception above alluded to, the parts were kept together, covered over, till the following morning, and then they were washed with water, and subjected to pressure with blotting-paper, previous to drying.

It may be right to state, that all the bodies were of British soldiers, and that they all died in Malta; and, as will appear from the dates, during the hot season, which this year has been unusually hot, the thermometer the whole time fluctuating between 80° and 90°.

Of the effects of desiccation on animal textures, I need say very little, as they are pretty generally known, and are such as might be expected *a priori*.

to mention, that I have seen two cases where it failed to produce any good effect. I accounted for these failures, however, from the substance having been too long kept in a state of powder.

In a few of the cases, the membranes gave way soon after the medicine was given. In such instances, there is some doubt whether the increase of pain was the effect of the ergot; yet in these the uterine action was somewhat increased previously to the rupture of the membranes.

In all the cases in which I have given it, I have never seen it attended with any bad consequences, either to the mother or child, as has sometimes been alleged. In one instance, a severe diarrhœa occurred a few hours after delivery, which, however, I did not scruple to attribute to some other cause, never having seen it in any other case.

I have not used it in any other than tedious labours; but I have no doubt it will be found beneficial in hæmorrhage, by promoting the contractions of the uterus; and in convulsions, by expediting the labour. It is, in such cases, highly extolled by Dr Waterhouse of Philadelphia, and recommended by Mr Ashwell, in his late work on parturition, provided the os uteri be fully dilated, and the os externum free from rigidity. Mr Michell *, in his publication on the subject, bears his decided testimony

* On difficult cases of Parturition, and the use of Ergot of Rye. By W. Michell, Member of the Royal College of Surgeons. London, 1828.

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state, that I have rarely seen it productive of any good effects in less than drachm doses.

Dr Dewees and Mr Ashwell lay down some rules for its exhibition, the most important of which are, 1*st*, That it should never be given before the membranes are ruptured, the os uteri dilated*, and the external parts disposed to yield. 2*d*, That it must not be used so long as the natural pains are efficient and competent to the end. The former gentleman recommends it also in cases of flooding before and after delivery, and convulsions occurring during labour, provided the two preceding rules are not violated. He has likewise found it advantageous in cases of menorrhagia, where the long continuance of the disease, rather than the immediate excess of the quantity discharged, rendered it important to arrest the flow.

In the Fourth Number of the Glasgow Medical Journal, Dr Macfarlane, in his Observations on Polypus of the Uterus, gives a case where the ergot appeared to act, by promoting the expulsion of the polypus. One drachm was infused in four ounces of water, and one ounce given every two hours. The whole was given before the effect was produced. In the course of a few hours, the tumour was discovered to be in the vagina. Four days after the exhibition of the ergot, the polypus fell off.

It has also been found beneficial in promoting the expulsion of the placenta.

* Mr Michell has frequently given it in cases where there was little or no dilatation of the os uteri.

I may add, that, although I have seen no bad consequences result from its use, yet caution appears to be requisite in giving it in those cases where obstacles exist to the delivery, as rupture of the uterus may possibly occur, where either the soft parts are rigid, or where a disproportion exists between the size of the head and the pelvis, from the resistance thus offered to the extited action of the uterus.

OBSERVATIONS

ON THE

TEMPERATURE

OF THE HUMAN BODY AFTER DEATH.

By John Davy, M. D. F. R. S. Physician to the Forces, Corresponding Member of the Society.

I am not aware that any precise thermometrical observations have hitherto been made on the temperature of the human body after death. I was induced to make trial of it, whenever a convenient opportunity occurred, from having in one fatal case found the deeply seated parts of a degree of temperature uncommonly elevated. As the subject is of that kind which requires as much accuracy as possible, I shall first relate the simple facts; and afterwards make some reflections on them. It will be necessary to notice the cases in which the observations were made, which I shall do as briefly as is compatible with the object in view. I may premise, that the subjects of all my thermometrical trials were men of our regiments; that the bodies, almost immediately after death, were removed to the room where they were to be examined; and, that

they were generally covered merely with a shell, and placed on a table of wood.

i.—Aged twenty-three years; was admitted into hospital on the 30th of July, labouring under symptoms (as it was supposed) of acute rheumatism, having severe pain, first in one shoulder, then in the other, followed by pain in the hips, attended with much pyrexia, and a very rapid pulse. He died on the 6th of August, a few minutes after seven o'clock, A. M. As the weather at the time was hot, and dead animal matter putrified rapidly, it was necessary to inspect the body as soon as possible. Accordingly, it was examined three hours and a-half after death; when the temperature of the air of the room was 86°. The appearances most remarkable, discovered on dissection, were extensive collections of matter on the right shoulder, amongst the muscles on each side of the spine of the scapula, with sinuses extending to the axilla, and round the capsule of the shoulder joints; and, a lesion of the same kind, and as extensive, in the left hip, close to the head of the femur, spreading through the glutei muscles; and marks of incipient inflammation (as ecchymosis) in the right hip. The viscera were apparently sound. The right cavities of the heart, and the great vessels, were distended with liquid blood. The body was slender, but not emaciated. Its surface was warm; the deeply seated parts felt very hot, imparting a disagreeable sensation, almost like that of burning, to the hand, in contact with them. The thorax was first opened, and af-

terwards the abdomen. After partial exposure to the air, of the surface of the contents of these cavities for about ten minutes, a thermometer was procured. Placed under the left ventricle of the heart, it rose to 113°; and, under the liver, in contact with the lobulus Spigelii, to 112°.

ii.—Aged twenty-seven years; a stout robust man, died suddenly in barracks, on the 6th of August, at about half past eleven, A. M. The body was examined at five, P. M. There was a good deal of reddish fluid in the ventricles, and at the base of the brain. The lungs were distended with black liquid blood, some of which had passed into the bronchia. There was very little blood in the cavities of the heart. The temperature of the air of the room was 86°. As soon as the cavities of the thorax and abdomen were opened, the bulb of a thermometer was in succession placed under the left ventricle of the heart, and under the lobulus Spigelii of the liver; in the former situation it rose to 108°; in the latter to 107°. About a quarter of an hour afterwards, introduced into the substance of the right lung, gorged with extravasated blood, it was 105°.

iii.—Aged twenty-five years; a large, stout, muscular man, was admitted into hospital on the 19th of August, with symptoms of continued fever. On the night of the 22d, he became delirious; but only for a short time. On the evening of the 24th he died suddenly and unexpectedly. The body was examined four hours and a half after death, during which time the temperature of the air of

the room had been between 78° and 80°. No organic disease was discovered on dissection, excepting of a chronic kind, and slight, and not explanatory of the fatal event; indeed, the abdominal and thoracic viscera, and the brain, were unusually sound. Notwithstanding the body was large and fat, its surface was cold; but the deeply seated parts were warm. A thermometer introduced under the left side of the heart, just after the pericardium was opened, rose to 97°, and under the liver close to the vena portæ, to 101°. The brain had been previously examined, and the cavities of the thorax and abdomen were opened about four hours after death. It may be remarked there was a great deal of blood in the cavities of the right side of the heart, and a small quantity in the left.

iv.—Aged twenty-one years; rather a large, muscular man, was admitted into hospital on the 21st of August; and died on the 11th of September, of acute dysentery. The examination of the body was commenced about four hours and a half after death, and the thermometrical observations were made about half an hour later; the temperature of the air at the time about 82°. The viscera in general were sound, excepting the large intestine, which exhibited the worst effects of dysentery. The trunk was warm; the extremities cold and rigid. A thermometer placed under the lobulus Spigelii of the liver, rose to 103°.5, and under the left ventricle of the heart, to 103°.

v.—Aged twenty-three years; a stout, muscular well made man; was admitted into hospital on the 9th of October, with symptoms of acute rheumatism, which were followed by those of remittent fever, but not very strongly marked, attended with a low degree of pyrexia, rather rapid respiration, and a pulse little accelerated. He died rather suddenly on the 16th of October. The body was examined fourteen hours after death; when the limbs were rigid and cold. The temperature of the air at the time was 69°. Some coagulable lymph was found adhering to the back part of the pleuræ; a corresponding portion of each lung was apparently hepatized; and, both the liver and spleen, and also the heart, were of a morbid degree of softness, and easily broken; more especially the two former, which were nearly of pultaceous consistence. A thermometer placed under the lobulus Spigelii of the liver, as soon as the cavity of the abdomen was opened, rose to 88°.

vi.—Aged twenty-four years; a large stout man; was admitted into hospital on the 12th of November 1827, with symptoms of acute rheumatism; and died on the 4th of November 1828, eighteen days after amputation of the thigh, on account of vast and complicated disease of the lower part of the limb involving the bone and knee joint, and twelve days after ligature of the femoral artery, on account of secondary hæmorrhage from the stump. The body was not emaciated. It was examined twelve hours after death; when the temperature of the air

was 68°. The branches of the femoral vein were found plugged up with coagulable lymph; the trunk of the vein was lined with coagulable lymph, and there was pus in the iliac vein. A thermometer placed under the lobulus Spigelii of the liver, rose to 94°, and under the heart to 93°.

vii.—Aged twenty-three years; a stout, well made man; was admitted into hospital on the 9th of November; and died on the 29th of same month, of acute dysentery. The body was examined three hours after death, when the temperature of the air was 66°. A large abscess was discovered in the liver, of which there were no symptoms during life; and the colon throughout exhibited, in a high degree, the ulceration and disorganization peculiar to dysentery. A thermometer placed under the lobulus Spigelii of the liver, rose to 96°; in the substance of the right lobe (in which the abscess existed) to 98°, and the same under the left ventricle of the heart. About five minutes after, when placed on the posterior horn of one of the lateral ventricles of the brain, it fell to 90°.

viii.—Aged thirty-three years; a tall, muscular, well made man; was admitted into hospital on the 30th November; and died on the 1st of December, of apoplexy, with hemiplegia. The symptoms were most distinct and violent; a large quantity of blood was abstracted, and energetic treatment employed. The body was examined two hours after death; during which time, the temperature of the room was between 60° and 64°. The cause of the symptoms

was not discovered by careful dissection. No blood was found extravasated on the brain; not more fluid than is usual in the ventricles; no softening of any part of the organ; no tumour making pressure on it; and, not a greater degree of fulness of its vessels and redness of its membranes, than is frequently met with in cases in which the powers of sense and intellect have remained unimpaired to the last. A thermometer, placed under the lobulus Spigelii of the liver, rose to 86°, and under the right ventricle to 88°, immediately after the cavities were opened.

ix.—Aged 23 years, a tall thin man, was admitted into hospital on the 13th of September, and died on the 3d of December, of phthisis pulmonalis, of slow progress, and mild symptoms. During the last month, there was no cough, no dyspnæa, no uneasy feeling, a slight diarrhœa, gradual wasting, and loss of strength. The body was examined five hours after death; during which time, the temperature of the air varied from 59° to 64°. The lungs abounded in small grey firm tubercles, and in small curd-like tubercles, and contained a few vomicæ; the principal part of their substance crepitous. The lymphatic glands of the thorax and abdomen, generally, were enlarged and softened in different degrees. There was an ulcer in the inner coat of the duodenum; many ulcers on this coat of the jejunum; and the ileum and large intestines abounded in ulcers, many of them deep and large. A thermometer introduced into the substance of the liver rose

to 90°; it indicated the same degree of heat placed under the lobulus Spigelii, and under the right ventricle of the heart, immediately after the thoracic and abdominal cavities had been opened. The skull-cap as soon as possible was removed, and immediately the membranes of the brain were divided by a deep incision, penetrating into the centre of the cerebrum, into which the thermometer being placed, it instantly fell to 82°.

x.—Aged 28 years; rather small, but a well-made man; was admitted into hospital on the 23d of December, with symptoms of an obscure kind, seeming to indicate disease of the liver; an occasional pain in the region of that organ, and also of the shoulder; a rigor now and then; a rapid pulse; little pyrexia, or loss of appetite or wasting. He died on the 31st of January. The body was examined seventeen hours and a half after death, during which time the temperature of the room was from 58° to 60°. The liver, large in its dimensions, was found to be excavated in a singular manner, not unlike a tuberculated lung, in its advanced stage of suppuration, abounding in vomicæ. The excavations in the liver were extremely numerous and labyrinth-like, so irregular were they in form, and communicating with each other so irregularly. Their walls were in many instances columnar, and the cavities intersected by columns containing bloodvessels, and by bloodvessels almost bone. Their contents was a viscid bilious purulent fluid; and its yellow colour was apparently derived from bile discharged from the widest

ends of the branches of the biliary duct, indicated by bright dark yellow spots on the surface of the excavations. In the situation of the vena portæ, there was a large sinus, which was ruptured by introducing the thermometer under the lobulus Spigelii and discharged a fluid similar to that described above. On minute examination, this sinus, lined with ragged coagulable lymph, and about thrice the size of the vena portæ, was found to be that vein itself vastly diseased; and the veins which terminate in the vena portæ were found terminating in it, empty, and their abrupt terminations in this sinus or sac closed with coagulable lymph. The hepatic artery, vein and duct (at least their trunks), were not diseased. The spleen was of usual size and appearance, but unusually compact and hard. A thermometer introduced into the centre of the cerebrum, so soon as the skull-cap was removed, rose to 70°; about half an hour after it rose to 82°, when placed under the right ventricle of the heart, and the same under the right lobe of the liver.

These examples, which I have introduced in the order, in point of time, in which they occurred, are the only ones in which I have tried the temperature of the body after death. They will probably be considered of very unequal interest, comparing those in which an unusually high temperature was noticed, with the majority in which the temperature was no higher than might have been expected. But I thought it right to give them all, without making

any selection, and without calculating whether they were likely to be considered important or trivial; such as they are, I can vouch for their accuracy.

It would be superfluous on this occasion to enter into any minute disquisition relative to the rationale of the very high temperature observed in the bodies Nos. i. and ii., in relation to the different degrees of temperature noticed in the other bodies. This question will naturally be asked, Was the extraordinary temperature in one case, of 113°, and in another of 108°, generated during life or after death? I have little hesitation in coming to the conclusion, that it was generated before death, and generated probably in the same way as the ordinary degree of animal heat experienced in health, or the extraordinary degree witnessed in febrile diseases. *A priori*, the effect of the heat-generating process, whatever it may be, cannot be limited. In many birds, it raises the temperature of the body to 109°, when in perfect health, and in man to 101°, at least in the tropics, without deranging health; and it is easy to conceive, that, by increased activity or energy, it may exalt the temperature to the common febrile height, or to a height greatly exceeding that. But, destitute of life, there does not appear to be in the body any source of heat, any power of generating it, that we are aware of. Putrefaction had not taken place in these bodies; I believe I may say it had hardly obscurely commenced. But if it had, and had made progress, and were it even at its greatest height of activity, I would beg to ask, would it be equal to

the production of the effect in question? I think it would not be. I am not aware that any, the slightest, degree of heat is generated by the putrefaction of animal matter. I have tried the temperature of blood, when it has rapidly become putrid, in hot weather, and I never observed it above the temperature of the air; and, in numerous experiments on putrefaction which I have made, I never witnessed any thing in the least indicative of generation of heat.

It may be matter of regret, that the temperature in the two first examples, was not ascertained before as well as after death. It is only known that the skin of No. i., the day he died, was pungently hot—the expression I believe used by Dr White, assistant-surgeon to the Forces, the zealous medical officer under whose care he was. As the weather at the time was oppressively hot, and the sensations of those in health, as well as of those labouring under disease, distressing more or less in relation to heat, less attention naturally would be paid to the degrees, and there would be the more difficulty in distinguishing them, and saying this is natural,—that morbid.

As the facts stand (and I trust I may venture to call these observations such), they may tend to put medical inquirers on their guard relative to the extreme limits of degree of animal temperature, and especially of the blood and deeply seated parts. If the temperature of a body, as in No. i. was 113°, three hours and a-half after death; and, if it was

generated during life, before death it must have been still higher. Let us suppose some part of this individual inflamed, and observations made on the heat of the inflamed part; it is easy to conceive that its temperature might be found unusually high,—and greatly exceeding the average temperature of the body in health, or in ordinary disease. If it were immediately concluded that this was an instance of the local generation of heat in the inflamed part,—it would be an assumption, and might be considered an error. And, have not observations of this kind been made and published, and adduced as arguments in reasoning on animal heat, as regards its theory.

Relative to the majority of the examples in which the temperature of the dead body was ascertained, I shall avoid making many reflections at present. I shall be well pleased if they induce others to continue an inquiry which may lead to interesting results, both as concerns physiology, and perhaps pathology. The temperature of a part, perhaps, may prove a safe criterion, *cæteris paribus*, of the quantity of blood which passes through it in a given time. According to this test, it may be inferred, that the supply of blood to the brain, in the ordinary estimates of it, is overrated, and very highly so. In examples No. vii. and x. the temperature of the central portion of the brain was 8° and more, lower than that of the heart; and I have observed as great a degree of difference, if I recollect rightly, between the temperature of these two parts,

in animals recently killed. In a paper of mine, published in the Philosophical Transactions for 1814, will be found the results of some observations of this kind, indicating a degree of coolness of the brain, in comparison with that of the heart, incompatible, it appears to me, with the view of a very copious supply of blood to the former organ; and were this the proper place, it might not be difficult to adduce other arguments in opposition to the commonly received notion.

May not the temperature of the deeply seated parts, after death, give some insight into the manner in which death has occurred, or help to elucidate its cause? In example No. ix. the temperature of the heart and liver was low. Was this connected with the state and function of the lungs, during the latter period of life, when much organic disease existed in them; their functional action appeared to be feeble, and the quantity of heat generated small?

The subject discloses many other openings for curious, and perhaps useful inquiries, which will naturally occur to the reflection of every one. I shall not point them out, or mention them vaguely, as I have not at present the means of illustrating them.

REMARKS ON STRICTURE,

WITH THREE CASES OF

STRICTURE OF THE ŒSOPHAGUS.

By William Cumin, M. D., Surgeon to the Royal Lunatic Asylum and Lock Hospital, Glasgow.

It is reasonable to suppose that stricture may take place in any of the tubes of the human body. Instances have been met with, where constriction, and even obliteration, have occurred in individual vessels of the three vascular systems. But it is chiefly in the tubes carrying secreted or excrementitious matters to the various outlets of the body, and in those destined for the admission of food, of air, and of the seminal fluid, that such constrictions are met with; and it is in these cases only that they become the objects of surgical treatment. All these tubes now alluded to possess one common characteristic, they are lined by mucous tissue, and some of them are strengthened exteriorly to this membrane, by muscular fibres. In some of these tubes, as the Fallopian, the trachea, the vas deferens, the lacteal tubes, and the parotid ducts, stricture is very rare. It is of more frequent occurrence in the ducts of

Warton, the ureters, the excretory ducts of the pancreas and liver, the Eustachian tube, and the œsophagus. It is still more common in the intestinal canal, the nasal passage for the tears, and the urethra.

Stricture, or partial obliteration of the lacteal tubes, is probably the efficient cause of what has been named the lacteal tumour of the mamma. During last summer, I had an opportunity, through the kindness of a medical friend, of seeing a case of this nature. The patient was a healthy married woman from the country, aged 25, who was then suckling an infant 3 months old. About 13 months before I saw her, she first perceived, in the breast, a tumour of the size of a pigeon's egg, which gradually increased; and enlarged rapidly after her confinement. The gentleman who shewed me the case, stated, that, two days previous, he observed a fluctuating tumour a little below, and to the outer side of, the left nipple. The integuments over it were, at one point, very thin, and appeared about to give way. Not being permitted to use a lancet, he scratched this point with a needle; and soon gave issue to above six ounces of milky fluid. On squeezing the part, the fluid became mixed with blood, and at length assumed something of a purulent appearance. A probe was now passed into the cavity, which was found to be of considerable extent, both in depth and laterally. When I saw the patient, another small opening had formed spontaneously in the other side of the nipple, from which milk flowed,

and milk was also frequently discharged from the natural apertures in the nipple. I squeezed, from the opening made by the needle, a good deal of pure milk, which became mixed at intervals, when the pressure was strongest, with streaks of blood; but it did not appear to contain any admixture of pus. Similar to the formation of the lacteal tumour, is that of ranula, which arises from constriction of one of the ducts of Warton. This disease furnishes a remarkable example of deviation from the usual law, by which wounds giving issue to secreted fluids become fistulous. It is very difficult, after the incision of ranula, to prevent adhesion, and preserve the opening patent. I have observed something similar in the treatment of fistula lachrymalis by the style, when the mucous lining of the nasal canal has been restored to a healthy state. Very soon after the removal of the instrument, the new aperture has healed up; but, in this case, a ready issue for the tears, through a depending opening, is presented by the natural channel.

Strictures are more readily formed in certain parts of tubes than in others; but it is difficult to name any part of a tube where contraction may not take place; as a consideration of the principal causes from which strictures arise will sufficiently explain. The great source of stricture in the various organs which it affects, is inflammation. This morbid state produces obstruction in various ways: a mere swelling of the mucous membrane may take place, or an effusion of serum and plastic lymph in-

to the textures beneath it. Inflammation is also followed by abrasion of the mucous surface, and the formation of warty excrescences, by ulceration and contracted cicatrix; and its presence is always accompanied by spasmodic action of the part, where it is surrounded by muscular fibres, as a natural consequence of its augmented sensibility. Another fruitful source of stricture is the degeneration of the mucous lining, or the walls of a tube, into various morbid states, more especially carcinoma. This last is the most frequent cause of stricture of the œsophagus, one of the rarest of stricture of the urethra. Indeed I have never met with any well authenticated case of carcinomatous stricture of this portion of the urinary passages; nor have I ever observed any distinctly such in the course of my practice *. One case, I must admit, occasioned me much anxiety, as the appearance presented by the mucous membrane of the urethra (the stricture being near to the orifice), at one time bore a close resemblance to what has been denominated scaly scirrhus.

A third cause of stricture is spasm. There are strong grounds for believing that this never occurs in the urethra, unless from the action of embracing muscles †. But, on the other hand, those

* Belmas refers to Beclard as having seen carcinomatous warty excrescences within the urethra. Thesis de Ischuria, p. 15.

† See Professor Charles Bell on the Urethra.

tubes which are provided with a distinct muscular coat, are peculiarly liable to spasmodic constrictions. Thus, the intestines and the gullet, more especially the latter, often suffer a derangement of their functions, from the occurrence of spasm; but it is usually an affection of a transient character, and not likely, unless inflammation should supervene, to prove difficult of removal. Irregular action of the circular fibres of the gullet, is, by no means, uncommon, especially in hysterical persons. In a more aggravated form, it arrests the progress of the food to the stomach, occasions vomiting, inducing emaciation and debility, and threatens to terminate in a truly organic obstruction of the part.

The following is an example of spasmodic strictures of the œsophagus :—

In the month of May 1827, I was consulted by a young lady, on account of dyspeptic and hysterical symptoms. She had come from a remote part of the country many months before, to attend on an aged relative, whose infirmities kept her almost constantly in bed. In this manner, the young woman's mode of life had been totally changed. From a country situation, and frequent exercise in the open air, she was confined to a sick room, engaged at her needle, or employed in assisting the invalid, with few intervals of exercise or recreation. For some time, her naturally vigorous constitution withstood the debilitating effects of her altered mode of life; but at length she began to complain of severe headach, the appetite fell off, the bowels were constipa-

ted; she became emaciated; vomiting of almost every thing she swallowed now occurred, and, in the end, pain was felt behind the cricoid cartilage, and the morsel was rejected with a sense of choking and stricture of the gullet. In this state, she applied to me. I prescribed for her such remedies as are usually ordered in hysterical and dyspeptic cases; but, in so doing, I was not satisfied that provision had been made for the most urgent and dangerous symptoms, the spasmodic affection of the gullet and vomiting. It appeared proper to examine the tube of the œsophagus, to ascertain if any more permanent disease had begun to form; and even should this not prove to be the case, there was reason to believe that the irritability of the part would be allayed by the passing of a smooth cylinder along its surface. A probang seemed more likely to increase than to diminish irritation, and even an elastic œsophagus bougie appeared too firm and bulky for my purpose. I made choice of a very large gum elastic catheter, and passed it readily, without causing either pain or irritation. The benefit which was derived from this was immediate: the spasms of the gullet were relieved, and the vomiting ceased. As the causes which had induced the train of symptoms already detailed continued still to operate, the headach and weakness of digestion were little benefitted by my prescriptions, and the affection of the gullet, after a short time, returned, though in a less severe degree. I was under the necessity of repeating the introduction of the catheter, and it was

again attended with relief; but it now became obvious that nothing short of a change of scene, free air, and healthful exercise, could restore the patient. I therefore sent her, in the month of July, to her friends in the country.

In relating this case, my only object is to exhibit a specimen of simple spasmodic stricture of the gullet, in a shape so aggravated as to afford ground for fearing that a permanent obstruction would in no long time have formed. Of all the tubes in the human body, there is none so powerfully muscular as the œsophagus; and, therefore, none where spasm is so likely to terminate in organic stricture. It appears to me to be necessary, in treating such cases, to throw the whole tube into one uniform state of contraction, while the strictured portion is dilated, by allowing the œsophagus to embrace, not a slender stalk supporting a globular or ovoid body, which is little better than a morsel of food, but a smooth cylinder of the same diameter throughout. The probang and the whalebone dilator are both objectionable under this view of the subject, since they throw the circular fibres of the gullet into different degrees of contraction at different points, and therefore less effectually resist any spasmodic action.

The formation of permanent obstructions of the œsophagus may arise either from the pressure of some tumour exterior to the walls of the tube, or from an alteration in the texture of the walls themselves. When this affection arises from a change in the texture of the tube itself, it is usually found to consist either in simple thickening and contrac-

tion, the effects of inflammation, or in the deposition of carcinomatous or encephaloid matter. Other morbid degenerations have occasionally been met with, and instances are recorded, where polypous and fungous growths have been discovered attached to the mucous membrane of the pharynx and œsophagus *.

I shall now proceed to narrate a case of stricture of the gullet, the result of inflammation, where the affected parts were thickened, contracted, and in a state of highly augmented sensibility.

On the 5th of January 1827, I was requested by Mr Robert Thomson, surgeon, to visit a little girl, who was dying of dysphagia. On the 11th of the preceding September, she had swallowed, mistaking it for treacle, a quantity of American potash in a state of deliquescence. The effects of this caustic were speedily declared by the agonizing cries which she uttered, and the excoriation of her lips and mouth. The immediate consequences of the unfortunate draught were successfully treated by means of sweet oil, milk, and such liquids. In ten days some sloughs had been discharged; her mouth and throat were soon healed; and it was now hoped that all danger was over. But about fourteen days after this apparent recovery, she began to experience some difficulty in swallowing, then the food was rejected by vomiting, and she gradually became more and more emaciated. During this period the case had been by no means neglected; but had been

* Monro on the Gullet. Baillie's Morbid Anatomy.

treated with great care and attention in the Royal Infirmary, from the 2d November 1826, till the 4th January 1827, on which day she was carried home, in order that she might die in her father's house, as he himself has since stated to me. From the particulars communicated by Mr Thomson, I own I had no expectation of being of any service to the little patient: indeed, he distinctly expressed his conviction, that the case was altogether hopeless. But unpromising as it appeared, it was not to be abandoned. I went, therefore, next day, provided with such instruments as seemed most likely to prove most useful. I cannot say that I ever witnessed a scene more truly distressing than that which presented itself when I entered the apartment where she was. The father was pacing the room in a state of agitation and despair, while in her mother's lap sat a little girl, not seven years old, worn to a skeleton, eagerly calling out for food, in a feeble voice; but rejecting it after every second mouthful into a small tankard, which her mother held in her hand, and which was already nearly filled. The thirst of the patient was not less urgent than her hunger. On the day preceding that in which I saw her, she had drank nearly six quarts of small beer; vomiting it as fast as it was swallowed. Her pulse was 120° and feeble, her skin cold and clammy, and her general debility such that she could neither stand nor sit erect. Under these circumstances, the great object which demanded immediate attention, was to support the patient's

strength; and as soon as that rallied, there was some hope of being able to dilate the contracted portion of the gullet at our leisure. For this purpose, a pretty firm gum elastic catheter, $\frac{1}{4}$th of an inch in diameter (No. 19 of my gauge,) was cautiously introduced into the mouth, passed down the œsophagus, and with some difficulty it at length cleared the stricture. Having accomplished this, I explained to the parents that there was now a prospect of saving the child's life, as we had it in our power to inject nourishing liquid into her stomach, which would prove infinitely more restorative than the injections into the bowel, which, for several weeks past, had afforded almost the only means of sustenance. But it was not deemed proper as yet to discontinue these injections; and it was agreed that the child should have a tepid bath in the evening, and that a somewhat smaller catheter should be employed, through which Mr Thomson was to inject soup into the stomach. On the succeeding day, although circumstances had prevented any fluid from being thrown into the stomach, there was a very great improvement in the patient's condition. She felt much easier after the passing of the instrument, and had been able to swallow liquids without rejecting any thing, except some viscid mucus. But a small portion of solid meat was vomited soon after being swallowed. The pulse, though still frequent, was of better strength, and the skin of natural warmth. I now introduced a gum catheter, somewhat smaller than the one first used; and,

taught by the difficulty of the preceding day, I gave it additional firmness by means of a slender whalebone rod. A quantity of nourishing soup was next injected through the instrument, to the great delight of the little patient, who felt it entering her stomach, and experienced from it a very pleasing sensation, to which she had been for a long time a stranger. Some resistance was met with from the spasmodic closure of the fauces, but very little from the stricture of the gullet. In the course of the operation, the canal was found to be choked up with mucus from the trachea and nostrils, which had been arrested by the stricture in its way to the stomach. The same circumstance continued to present itself every time the instrument was introduced, until the canal was so much dilated as to admit of the ready passage of the mucus downwards. Directions were given for the repetition of the injection of food into the stomach, enemata, and the tepid bath.

January 21. Every thing had continued progressively improving, although the introduction of the instrument of late was not accomplished without considerable struggles on the part of the patient, who had now recovered a good deal of strength. It had become necessary to introduce a gag into her mouth, and to secure her arms and legs. A No. 18 catheter was passed to day, after being stopped by a stricture at 9 inches from the edge of the upper incisors. When passed, it felt free, and was withdrawn with ease: No. 19 (one size larger) was

next introduced: it stopped at the same spot, or perhaps a little nearer to the mouth, but after a short delay the stricture yielded slowly to the pressure, and the catheter cleared the obstacle. On attempting to withdraw the instrument, it was found to be pretty firmly grasped by the stricture. This was the same instrument which had been introduced the first visit: but the patient was now comparatively vigorous, instead of being in a dying state; and, therefore, the resistance of the stricture was greater.—January 23. After passing, No. 18 catheter an attempt was made to introduce a gum bougie of No. 19, but it only entered the stricture, and the efforts used to force it on, caused a great deal of pain. It twisted under the hand in every direction, and was quite inferior in firmness and elasticity to the catheter and whalebone stilette. The patient had continued improving, and was now able to swallow solid veal jelly without vomiting. Leeches were ordered near to the seat of the pain caused by the instrument. The catheter was to be omitted on the succeeding day, and half a grain of extract of Belladonna was directed to be given an hour before it was next used. The introduction of a catheter was next repeated every two or three days, leeches were applied to the back or scrobiculus cordis, and the Belladonna was continued in increasing doses.

On the 9th February, little more than a month from the time I first saw her, catheter No. 22. was passed, with the assistance of the patient attempting to swallow it—a temper in which she was indeed

very seldom found. When withdrawn, it was pretty firmly grasped. I learned that uniformly, as soon as the instrument was withdrawn, she felt a severe burning pain at the scrobiculus cordis, which, after a few minutes, went off, and she then became well and cheerful. When she awoke in the morning, she was incapable of swallowing solid food, but after taking a few mouthfuls of liquid, she could then eat her porridge with the rest of the family; of late even considerable pieces of potato had been swallowed, without causing a return of the vomiting. Her general health and strength were now almost completely restored.

The progress of the case became, at this period, rather slow, partly from the resistance of the little patient, and the conviction of the parents that her life was no longer in danger; but principally from the want of instruments of a proper length and size. Having succeeded at last in procuring a catheter $\frac{5}{16}$ths of an inch in diameter, after one or two trials, and securing the patient in a sack, the only method which could be devised of restraining her violent kicking and plunging, I introduced it on the 16th of April, without much difficulty, into the stomach. A good deal of retching and some pain followed, but no blood was discharged. Leeches ordered. She was now so vigorous and so cunning as sometimes to resist successfully the introduction of the instrument; and on more than one occasion the violent excitement produced by her struggles rendered it necessary to have recourse to blood-

letting. At length, on the 29th of April, soon after the instrument had been withdrawn, she brought up a teaspoonful of pure blood; and in an hour thereafter she was seized with pains in the chest, shoulders, and head. The skin soon became hot, and the pulse rose to 140. She continued in an alarming state for some days, during which bloodletting, leeches, calomel, and other purgatives, were employed with advantage. By the 5th of May, she was convalescent, and on the 20th she walked to my house a distance of a mile and a half. A considerable interruption to the passing of instruments was caused by this inflammatory attack, and some delay arose subsequently, from my inability to procure elastic tubes of suitable dimensions. They were at length received, and I succeeded, on the 5th of August, in passing a tube nearly $\frac{7}{8}$ths of an inch in diameter. On the 16th of September, one very nearly half an inch in diameter was passed into the stomach, without any difficulty. Since that date she has continued to improve in strength, without any return of impediment in deglutition, unless when she eats hurriedly, and then a spasmodic action is occasionally induced. I have seen her repeatedly at different intervals; on the last occasion November 8. 1828, she was healthy and vigorous, and was then daily employed assisting her father at his work as a calico-printer.

The principles on which the treatment of this case was conducted, were, in the first place, to revive and sustain the strength of the patient; in the next, to

remove local inflammation and spasm; and, thirdly, to dilate the contracted portion of the gullet. The details which I have given seem to prove satisfactorily, that the application of leeches near to the seat of the disease, and even general bloodletting, are highly important in the treatment of stricture of the œsophagus; and I could refer to more than one case already on record, where the symptoms evidently indicated the propriety of such depletion. Even in cases where the affection is at first unaccompanied by inflammation of the part, this condition will soon be induced by the attempts at dilatation; and the employment of leeches or the lancet will then be found requisite. I am disposed also to think, that some cases entirely of a spasmodic nature will be met with, where local depletion may be had recourse to with advantage.

The wax bougie, the elastic bougie, the whalebone dilator, and even the silver catheter *, have all been used for the purpose of overcoming obstructions of the œsophagus; but none of these possesses the advantages of the elastic tube, armed with a whalebone stilette. In the case before us, all these instruments, excepting the silver catheter, were had recourse to, and the only one which proved of any avail was the elastic tube and stilette. To this I ascribe my success; and I am not aware that the treatment of strictured œsophagus, by means of the

* Boyer, Malad. Chirurg. t. vii. p. 173.

elastic tube strengthened in this manner, had ever been practised in any former case. In pliant elasticity, with adequate strength, it excels all other instruments; and it communicates to the hand of the operator a knowledge of the obstruction almost as distinct as an instrument of metal. In this manner, it proves at once safe and efficient, enabling us to dilate strictures which must have resisted the bougie. Those who have not treated a stricture of this nature, cannot easily form an idea of the force which may be safely applied to the instrument, in such cases, and which is actually required to ensure a successful result. It is scarcely necessary to add, that the whalebone rod must not fill the cavity of the tube, and that the requisite degree of strength may be given by increasing or diminishing the thickness of the elastic stilette. I cannot close these remarks, without expressing the great obligation which I feel to Mr Thomson, for the able assistance which he afforded me in the treatment of this case, and the unremitting attention which he bestowed on the patient during its whole progress.

The third species of œsophageal stricture, of which I propose to present an example, is that which arises from a morbid degeneration of the mucous membrane of the walls of the gullet.

I was requested, on the 22d of August 1827, by Mr Drysdale, to consult with him on the case of Miss H. aged 45, who was suffering under obstruction of the œsophagus. On visiting her next day, I found that she dated her complaint from the be-

ginning of January of that year, when she first experienced some difficulty in swallowing dry food; and by the 1st of April, this had greatly increased, so that she soon after placed herself under the care of a surgeon. She had, since that period, been under treatment at her home in a distant part of the country; and had lately repaired to Edinburgh, for the benefit of advice. The able surgeon under whose care she first was, endeavoured to dilate the obstructed portion of the gullet by means of bougies and elastic catheters; and a physician of great and deserved reputation in Edinburgh had recently recommended a perseverance in the same practice. I found the patient of a sickly and emaciated appearance, with a pulse at 96, and symptoms of slight hectic fever. The fauces and pharynx appeared to be naturally narrow. I attempted to pass a gum elastic catheter of a moderate size, but after seemingly penetrating one obstruction, it was stopped about 5 inches from the edge of the upper incisors. A little mucus tinged with blood was brought up after this trial, and when she attempted to drink, she succeeded, with difficulty, in swallowing several very small quantities of the liquid. The history of the case, and the examination which I had made, convinced me that there existed an organic obstruction in the œsophagus; and I could not refrain from expressing to the medical gentleman in attendance my fears that it would prove of a cancerous nature. Under these circumstances, we agreed that no further attempt at dilatation should be made,

and that the only application which was likely to prove beneficial, and could be had recourse to with safety, was the nitrate of silver. Attempts were made to obtain an impression of the stricture, and the caustic was applied by means of the armed bougie, and a porte caustique of whalebone. In the mean while, the patient was encouraged to swallow the most nourishing liquids, and enemata of soup and milk were directed to be injected several times in the day. Baths also were had recourse to; but her strength obviously declining, and the dysphagia gaining ground, I attempted to force a small gum catheter, with a whalebone stilette, through the stricture, in the hope of being able thus to introduce liquid food into the stomach *. I did not succeed. The symptoms made daily progress, and the occurrence of considerable irritation from the caustic caused it to be relinquished. At length the patient, who slept in the same bed with a young lady suffering under the dysentery then prevalent in Glasgow, was seized with purging. The discharges were dark, mixed with blood and mucus, and sometimes consisted of little besides a sanious liquid, resembling the thinner part of minced beef, which had been cooked; but she complained neither of pain

* Boyer gives a case where life was prolonged for several weeks, by forcing a stricture of the œsophagus. I think it probable that the disease was, in this instance, cancerous, but the body was not opened.—*Malad. Chirurg.* t. vii. p. 172.

nor tenesmus. In a frame so feeble and emaciated, it was not to be expected that all the urgent symptoms of dysentery should be present; but I cannot doubt that this was really her disease; and I am disposed to consider it the effect of contagion. On the 12th of September, after a great deal of suffering, and being reduced, during the last two days, to a state of extraordinary weakness, she died completely exhausted.

Inspection.—The whole circle of the pharynx from a little below the top of the arytenoid cartilages, to its inferior extremity, and of the œsophagus for above half an inch, was covered by a yellowish white substance, having an uneven tuberculated surface, and a texture varying from that of firmly coagulated lymph to that of soft cartilage. This morbid formation was generally a quarter of an inch thick; but at the middle and anteriorly, it was half an inch in thickness, much firmer in texture, and when cut into, the divided surface presented many small cavities, from which a viscid opake mucus of a pink tinge exuded. The morbid formation appeared to be decidedly cancerous, although it did not exhibit any striæ or shining bands: its texture, on the contrary, was granular, and it presented a good specimen of what has been named scaly scirrhus.* The diseased growth had formed a stricture at the extremity of the pharynx and top of the œsophagus; and, at the latter point, had so filled up the

* See an excellent delineation of this morbid structure in Dr Armstrong's plates of diseases of the stomach.

passage, that it would hardly admit a crow-quill. Above and rather to the left of the narrowest part of the stricture, was a dark ragged indentation, nearly of the diameter of a sixpence, and corresponding to the instrument armed with caustic which had been employed. There were no distinct marks of erosion or ulceration in any other spot. The diseased formation at either extremity, and particularly at its termination in the œsophagus, had a prominent border, like the new bark which forms on the wounds of trees; and it could be peeled off from the mucous membrane for nearly half an inch upwards. Beyond this, the membrane was found incorporated with the morbid growth; and the muscular fibres which lay under the thickest part of it were softened and changed to a yellow colour. A gland, the size of a hazel nut, situate behind the œsophagus, was found to contain a quantity of viscid opake fluid. The portion of the œsophagus which was unaffected by the degeneration already described, presented an unusually vascular appearance, particularly for an inch near its cardiac extremity; but in other respects it was sound. The lungs and heart were healthy.

SOME ACCOUNT

OF A

CEREBRAL AFFECTION,

AS ARISING DURING THE COURSE OF PULMONARY CONSUMPTION, AND ARRESTING THE FURTHER PROGRESS OF THAT FATAL DISEASE.

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(Communicated by Dr ABERCROMBIE.)

IT has now become altogether unnecessary to recommend the study of pathology. Its value is at this day well understood; and it seems to be received as an indisputable truth, that a diligent observation of the phenomena of disease, together with a due study of morbid anatomy, whether as constituting the cause or effect of diseased action, and of the fatal termination, is the legitimate source of all the improvements of which the healing art is susceptible. Even in our own times, much labour has been bestowed in illustrating the nature and effects of that connexion, which is known to subsist between the diseases of particular organs, and certain morbid af-

fections arising during their course, in other and often remote parts of the system. It is true the causes of this affinity are still involved in much obscurity, as well as those peculiarities of individual habit which influence the appearance, and often modify the form and intensity, of these secondary disorders. The facts themselves are, however, established beyond all controversy; even the general laws by which they are regulated, as far as they are the objects of observation and inference, have been diligently traced, and have led to principles of rational and successful treatment.

The purpose of the following observations is to solicit the attention of the medical public to a complication of this nature; which, although occasionally observed, appears to have been viewed hitherto as an isolated fact, and without reference to any principle of pathology. It consists in a cerebral disease occurring during the course, and usually in an advanced stage, of phthisis pulmonalis; and, after a few days' duration, suspending and superseding the further progress of the lung disease. Cases of this kind have arisen, and claimed the attention of men in extensive practice; but, as far as is known to the writer, have never been so described in their proper connexion, as to fix the attention, and influence the conduct, of the physician, at that point of time when it is probable that an entire new view of the case, and a correspondent change in the treatment, might decide the fatal or the favourable issue to the patient.

There can be no doubt that every thing deduced from just observation, that may tend to illustrate the history, prognosis, or management of so frequent and formidable a disease as lung consumption, will obtain a fair hearing from the medical faculty: a disease with which we come daily into contact, must be interesting to every practitioner; nor can it be matter of indifference to any one, that he is or is not acquainted with this disease, not only in its more usual appearances and progress; but also in every form which it is capable of assuming, and every change it may undergo, even in rare instances.

That examples of this nature occur, and prove extremely perplexing to those practitioners, who entertain no suspicion of the nature of the impending change, at its commencement, or foresee its consequences, I am authorised, from my own experience, to affirm. With phthisis pulmonalis, in its usual forms, every practical physician in this island is but too familiarly acquainted; although in its incipient state, it is very generally concealed by the insidious nature of the symptoms, and the consequent negligence of the patient, who is rarely aroused to a sense of his danger, till it be too late. In the instances within my observation, where a cerebral affection has supervened to phthisis, it has always arisen in an advanced state of what has been described as the second stage of that disease; when the cough, with pains or stricture of the chest, had been of long standing, accompanied with confirmed hectic, and an expectoration more or less copious,

and chiefly purulent, together with emaciation, and dyspnœa to a certain extent. Under these circumstances, the change is announced by an acute headach occurring without any assignable cause, at first somewhat remittent, but on the whole increasing in severity; insomuch that, within 48 hours after its commencement, it has often become the chief object of attention. About this time the stomach has become disturbed, with more or less of nausea, and occasionally with retching. In this early stage, it is likely to be viewed and treated, as originating in a disordered condition of stomach, of which the headach was symptomatic; but the increasing intensity of cephalalgia, accompanied with throbbing in the head, flushing in the face, and sometimes with an injected state of the vessels of the conjunctiva in one or both eyes, which usually succeed one another in the first four days, would lead an attentive practitioner to correct his first impression, and refer the symptoms to their real seat, the brain. This is soon put beyond all doubt, by more or less of delirium occurring after the disturbed slumbers to which the patient has now become more prone. During the few days that this new disease has made such hasty progress, and has, by its urgency, absorbed the whole attention of the sufferer, and his friends, and, in the end, even of his medical attendant, it has become evident that the cough and expectoration have gradually abated, and that without creating any sense of oppression at the chest, or any increase of dyspnœa. The febrile symptoms have, indeed, sub-

sisted, or even in an aggravated degree, but, with little, if any remission, and without perspiration.

This is the usual state and degree of the attack in young persons, and those of sanguineous habit: but there are instances, of which one or two occur in the cases to be produced, as exemplifying these observations, in which the headach, and all the symptoms connected with it, began in a degree so moderate, and increased so gradually, that fourteen or fifteen days elapsed before they had acquired the character of a cerebral affection. Under this modification of the disease, the physician, to whose care such a case is consigned, without any previous acquaintance with the change that is going on, is placed under circumstances of no ordinary difficulty. He feels himself called upon to decide upon principles of treatment, very different from those he had been pursuing, and adapted to the disease in this its novel form: whilst the earnest entreaty of the relations require from him some exposition of his views on this new, and unexpected turn of the disease, and his opinion relating to its future progress, and final result.

Taking all the circumstances into account, would he not be apt to conceive, and to declare his belief, that the new symptoms originated in some considerable, though accidental, derangement of the alimentary canal, unconnected with the pulmonary disease, and which would be likely to yield to proper management within a short period? that, although the progress of the original disease appeared,

for the present, to be superseded by the new actions, yet there was ground to apprehend that this would prove merely temporary; that it would speedily recur, with all its concomitants; and, after pursuing its usual course, would fulfil his original prognostic of its fatal tendency?

Yet all this turns out to be the very reverse of the truth; the train of symptoms soon unmasks the nature of the recent affection, and marks it as an idiopathic disease of the brain, of no ordinary severity, which the physician has to cope with, under very disadvantageous circumstances, and now that it is probably too late to pursue, with efficacy, the plan he would have adopted at first, had he been aware of the nature of the change that had taken place. Sooner or later, it assumes all the characters of an inflammatory affection of the brain; and, in a few instances, is accompanied with the true phrenitic delirium: more frequently the delirium is moderate, and at first only after disturbed sleep; but gradually becomes more permanent; the patient complains less of intensity of pain in the head, but betrays much drowsiness, with a certain wildness and confusion of countenance; yet I have never observed any strabismus. The pulse, which at first had risen as high as 120 or 130 in the minute, is afterwards, in some cases, much reduced in frequency, even as low as 70 or 80 in the minute. This, however, is far from uniform, the pulse often continuing rapid to the end; but, whether slow or rapid, is always characterised by that peculiar instability which is so

generally present during inflammatory action in the brain, and which I conceive to be more certainly diagnostic of this affection, than any other symptom taken apart. It consists, not in intermissions, but in irregularity in the intervals, and a great degree of inequality in the fulness and force of successive pulsations. This character of the pulse, of so marked a kind, is not indeed present at all moments; but it is frequently recurring during the inflammatory stage, and is more generally present than absent. By the time that the cerebral disease has advanced thus far, the cough, the dyspnœa, the expectoration, and every trace of the previous pulmonary affection, has disappeared; and, in the single instance in which I have seen the disease of the brain successfully treated, that of the lungs never returned. This is the only case of favourable termination that it has fallen to my lot to observe; and, from the nature and seat of both the diseases in question, such events are likely to be rare; yet I am inclined to believe, that an early and spirited plan of treatment, directed to the removal of inflammation in the brain, or its appendages, promises a degree of success much beyond what I have witnessed. Hitherto the fact is, that the disease has held the same course, up to its fatal issue, and put on the same appearances as those affections where dissection has proved it to have originated in inflammation issuing in an effusion between the membranes, or in the cavities; or in an abscess in the substance of the brain. To the throbbing headach, as already described, accom-

panied at first with sickness, and afterwards with more or less confusion and delirium, comatose symptoms have succeeded, together with a suffused countenance and subsultus tendinum; but I have seen no case where convulsions supervened; the susceptibility of the pupils to a bright light has been impaired, but not obliterated; and the patient has, to the last, been occasionally roused to some degree of consciousness and sensibility. The pulse, if at an earlier stage retarded, generally acquired an excessive rapidity before the fatal event occurred; yet this was uncertain, as, in the first case that happened in my practice, the patient expired with a pulse between 70 and 80, and more regular than it had been at an earlier period of her disease.

To these general observations, it will be expected that I should furnish, from my own practice, such a number of cases as may afford a sufficient specimen of the nature and course of this affection, and may suffice to illustrate the singular connexion, and the influence exerted by two formidable diseases upon one another; especially as I must conclude it to have been but rarely observed, and certainly little noticed, by medical writers.

Case I.—Mrs W. of L. Bennington, Lincolnshire, a married lady, about thirty, who had never been pregnant, of a sallow complexion, and what is called the leucophlegmatic temperament, had a cough, accompanied, I have no doubt, with some fever, during the winter of 1777 and 1778. At my

first visit, in March 1778, her complaints had assumed a decided form. I found her with all the symptoms announcing obstructions in the lungs, viz. cough, fever, dyspnœa, general uneasiness in the chest, and mucous expectoration, accompanied with dyspeptic complaints, to which she was constitutionally subject. Being at some distance from my residence, I did not see her again till May, when I found, as I expected, that the disease had made a considerable progress, that all the symptoms were aggravated, the expectoration more abundant and purulent, a very perceptible emaciation, and occasionally disturbance in the bowels, as well as indigestion. Upon this occasion, the lady's husband, a man of warm feelings and affections, who commanded a ship in the West India trade, requested my explicit opinion of his wife's situation, as that must determine his professional undertakings for the present. I did not conceal from him my opinion that the disease was truly consumptive, and my apprehensions of its fatal termination; but added, that, although the disease might advance during the summer, the progress would probably be slow, and that urgent danger would not be likely to arise till the approach of winter.

I did not see my patient again till the beginning of June, when my visit was required more particularly on account of a headache, which at first was disregarded, but had now continued for several days, and had increased so as to require some immediate relief. I found the headache to be accompanied

with throbbing, with sickness at stomach, and occasional retching to vomit, although little was brought up. There was no increase of fever; the cough and expectoration subsisted, but were less troublesome. I was now again called upon by the husband to state my opinion of this new and unexpected turn in his wife's disorder. This I did candidly, and on the presumption that the new symptoms were but temporary, and would yield to leeches, fomentations, and an emetic which I had prescribed; adding, that the consumptive symptoms still constituted the main difficulty; that they were obscured for the present, but that I expected their return; and that, in respect to the disease of the lungs, I was bound to speak the same language in regard to its termination, as I had done before. Unfortunately for the prognostic, no part of this opinion was confirmed; the headach yielded to none of the remedies, nor to a blister, but increased in severity, and, in a few days, began to be accompanied with fits of dosing delirium. From this time I visited my patient regularly till her death, which happened on the 22d of June. I had the opportunity to observe the daily abatement of cough, expectoration, and every symptom of thoracic affection, till they wholly ceased, and never recurred. Under these circumstances, I became alarmed for immediate danger, but it was too late. The alarming symptoms of cerebral disease were never alleviated, and made a rapid progress. The patient became comatose, with general impaired sensibility, the pupils somewhat dilated. The pulse which, on the first attack of

headach, had become slower, continued so, and was at the rate of 80 in the minute a few minutes before she expired. It was then soft, full, and more regular, than in the earlier part of the last attack. Although, in the last stage, she was generally delirious or comatose, she had occasional returns of complete consciousness. Her death happened about three weeks from the first seizure of headach. My earnest desire to have the body inspected was not complied with; a disappointment which I ascribed to the loss of that confidence which the patient's husband had been accustomed to repose in my opinion.

CASE II.—Mr W. R., a young gentleman, twenty-two years of age, of slender make, and distinguished mental talents, had, in his childhood, been subject to an enlargement of the glands of the neck, which, as he grew up, disappeared, but he was delicate, and liable to frequent returns of cough, which gradually settled into a pulmonary affection, in the autumn of 1782. This crept on during the winter, and, in the spring of the year 1783, he was considered by all his relations, who entertained the greatest anxiety about him, and by two very experienced surgeons who attended him, to be in a very advanced state of consumption. This was the account I received at my first visit on the 7th of April; and it was fully confirmed by his great emaciation, hectic fever, night sweats, frequent cough, and copious expectoration of a purulent appearance. My visit

was more immediately desired on account of a headach, which had come on a few days before, and was an entirely new symptom, accompanied with frequent nausea, and provocation to vomit. It had been remarked, that since the seizure of headach, the cough and spitting had abated, although both still subsisted in a considerable degree. From this time the disease of the head gradually advanced, while that of the lungs receded; so that, at the end of a week from my first visit, the headach continued with unabated severity, together with great irritability of stomach, vertigo, throbbing at the temples, and dazzling of the eyes, and he began to be delirious after disturbed slumbers. In the mean time, the fever ran high, yet the cough, expectoration, and profuse perspirations, had wholly disappeared, without any dyspnœa or sense of oppression at the chest. The phrenitic affection continued its course, without appearing to be relieved more than in a very temporary way by leeches, blisters, aperient and refrigerant medicines. Its progress, however, was slow, no symptoms of coma occurring till the 4th of May, after which the headach was no longer complained of, although at intervals he was conscious, and tolerably clear. These intervals became less frequent; the stupor, with a fixed stare of the eyes, gained ground, the pulse, having that peculiar irregularity which denotes cerebral disease, ran from 130 to 140 in the minute. In this state he lived till the 12th of May, without any return of cough or spitting, and died without convulsions.

Leave was obtained to open the body, and it was examined, in my presence, with great attention. A regular minute of all the appearances was certainly taken on the spot, but unfortunately no such notes were to be found, when searched for some years afterwards. The case and the dissection had made a deep impression on all concerned, and was by no means effaced from my mind; but, that the appearances might have all the authenticity that circumstances admitted, I prefer stating, in his own words, what I am enabled to do by the kindness of Mr Maddock, who opened the body, and who, at my request, transmitted to me in writing, his own clear account of the case in a few words, as follows:—

"I have a most perfect recollection of attending, with my late brother William, the son of G. R. Esq. with such unequivocal symptoms of phthisis pulmonalis, as left no doubt of the nature of the disease, and its fatal consequences. Some time previous to his death, he began to complain of pain in his head, which occasionally was excruciating, and continued with little abatement till his decease. From the commencement of this attack there was a gradual, and at length a total, cessation of pulmonic affection. I think it was in this modified state of the disease that you was consulted. The brain was examined after death, and an ulceration discovered near the sella turcica, which appeared to be the consequence of a previous abscess on that part of the brain. I am sorry that I have no recollection of the state of the ventricles, nor of the thoracic viscera."

To Mr Maddock's report, in which I fully concur, I decline adding a syllable from my own recollection, as several years intervened before there was any intention to record this case, or its consequences.

CASE III.—Mr C. about 25 years of age, engaged in the manufacture of this place, a person of a thin habit and sallow complexion, requested my assistance at his own house, on the 18th of May 1783. He had hitherto consulted me occasionally on account of pulmonary complaints, under which he had laboured more or less for years. He was now much emaciated, and the hectic fever, accompanied with a teasing cough and copious expectoration, ran so high that he was confined to his room; the dyspnœa was also very harassing. He continued in this state till the 27th of May, taking refrigerant, anodyne, and expectorant medicines, with occasional small doses of ipecacuan. On that or the preceding day, he began to complain of vertigo and headach. I requested him, from that time, to pay particular attention to the state of the cough, shortness of breathing, and spitting, and report to me any change in these symptoms. At my next visit, I found the headach still more distressing, with vertigo and nausea; but all the former symptoms of pulmonary disease perceptibly abated. This I considered as a criterion of the true nature of the affection; and, instructed by the cases already related, of which the last was quite recent, I

saw the necessity of adopting a prompt and more decided plan of treatment. After one bleeding from the arm, probably to much less extent than I should at this day deem necessary, I had the scalp shaved and blistered. The patient having been previously briskly purged, and the bowels laxatively disposed, calomel was prescribed, at first combined with a small proportion of opium, and afterwards by itself, and was regularly taken till the mouth became affected; this took place on the 4th or 5th day after its commencement. Up to this time, the cephalalgia with vertigo, throbbing, and occasional sickness, had continued rather to increase, whilst the cough, spitting, and dyspnœa, had nearly disappeared. Soon after the ptyalism came on, the headach began to abate, and proved an encouragement to the patient to persevere in the plan recommended, of repeating the calomel at such intervals as to maintain a moderate salivation. This was kept up for ten days; at the end of which the phrenitic symptoms were entirely subdued; and those of the previous pulmonary affection having ceased, without shewing any tendency to recur, the mercurial was laid aside, and the patient advised to pursue the same regulated diet he had long adopted, and to take a laxative twice a week. Within four weeks from the attack of headach, Mr C. was distinctly convalescent, and had begun to recover flesh; and he never suffered any return of the consumptive symptoms to which he had been for years subject. He married soon after, and had

one child, a girl, who was carried off with true lung consumption at the age of sixteen, while under my care; her father still, at that time, in the enjoyment of good health. Thus favourably terminated a case, which, at the first approach of cephalalgic symptoms, bore as formidable an aspect as any of the preceding.

CASE IV.—Miss M. P., a florid girl about 14, after suffering, for some time, with glaudular swellings in the neck, and a strumous abscess in the side, began, early in the year 1785, to be affected with cough, hectic fever, and other symptoms of pulmonary phthisis. This made so rapid a progress, that, in the beginning of June, she was greatly reduced in flesh and strength; having a constant fever with profuse night sweats, a copious expectoration of a purulent appearance, harassing cough and dyspnœa. About this time she was taken with headach, to which she had not previously been subject, but which, in a few days, became so excruciating as to gain an ascendancy over all the other symptoms; indeed the cough and spitting soon wholly disappeared, and never returned: in the mean time, the affection of the head acquired the true phrenitic character. The cephalalgia was, for some time, highly distressing, and accompanied with flushing, throbbing, and vertigo. It yielded to no evacuations or other remedies adopted; and gradually changed into a fixed, and, at times, a violent delirium, with intervals of comatose slumbers, and a very variable

pulse. In this state she survived for two weeks, and at length sunk under symptoms of exhaustion and oppressed brain, but with no return of pulmonary disease. Circumstances did not admit the inspection of the body.

CASE V.—Mr W. N., a young gentleman of slender form and fair complexion, being engaged in an apprenticeship to the manufacture of this place, was necessarily subjected to some confinement in a warehouse, and, in the winter 1785 and 1786, became affected with a cough; this gradually gained ground, and being accompanied with feverishness and loss of flesh, there was every reason to apprehend phthisis pulmonalis. His relations became alarmed. Some relief from confinement was obtained, and he took frequent easy rides into the country; but neither this nor the medical treatment adopted, availed in retarding the progress of the consumptive symptoms, which advanced rather rapidly, so that, in the month of May, the disease appeared to be completely confirmed, and was characterized by a rapid pulse, emaciation, considerable night sweats, cough, some expectoration, and disordered respiration. All these symptoms appeared to be on the increase, when, in the beginning of June, the patient was seized with headach, accompanied with fits of giddiness, nausea, and even efforts to vomit. These new symptoms had not subsisted for many days, when it became evident to all about

him, that the cough, spitting, &c. had greatly abated; and, in a few more days, these, together with every symptom of lung affection, had entirely ceased; while the symptoms denoting disease of the brain became more confirmed. The cephalalgia never grew so acute and excruciating as in some of the foregoing cases; and appeared, on some days, to have been relieved by leeches, blisters, calomel, and purgatives; but this relief proved merely temporary, and the symptoms of phrenitic affection recurred with increased severity, accompanied with delirium, twitchings, stupor, and dilated pupils. The pulse was, at one time, slow and unstable; but, in the last stage of the disease, it became again rapid, but very unequally so at different times. In this way, the disease held its usual course, and terminated fatally at the end of four weeks from the first invasion of cerebral disease.

In the treatment of this disease, I had the valuable assistance of the late Doctor Whyte, and of my friend and colleague Doctor Pennington. We were all present when the body was inspected at a proper interval after death. Several tubercles were found in the substance of one lung, and, in one part of it, an ulceration of moderate extent; it was merely moist on its surface, contained no matter, and appeared to all present to be in a healing state. An abscess, containing purulence of a curdy appearance, was discovered in the cortical substance of one of the hemispheres of the brain, of a size sufficient

to have contained a small chesnut. There was also effusion of serum, to the amount of an ounce, in the ventricles.

Case VI.—Having occasion to be in a distant part of a neighbouring county in the year 1789, I was consulted in the case of a boy, about eleven years of age, who had a white swelling of the knee. He was also labouring under the usual symptoms of lung consumption, a hectic fever with cough, spitting, and increasing emaciation. After prescribing such a plan of regimen and medical treatment as appeared to me adapted to the actual condition of the patient at the time of my visit, I had no opportunity of seeing the case afterwards; and am obliged, for the sequel, to the correspondence of the medical attendant, a man of much experience, and in the habit of accurate observation. Some weeks afterwards, I was informed that no material change had taken place in the knee, but that the consumptive symptoms were making rapid progress, with great emaciation and debility. Within a month after this report, I received a letter from the same gentleman, stating that a singular and unexpected change had arisen in the case of the consumptive boy I had been consulted for; "that his cough, spitting, &c. seemed all at once to have been arrested in their progress; that he was now attacked with severe headach and sickness, arising either from a disordered stomach, or some more formidable malady, on the nature and treatment of which my

opinion was desired." I replied that my practice had furnished me with several instances, similar to what, I supposed, this would turn out; that, in all probability, the pulmonary symptoms would not reappear; that, in such cases, there appeared to be a transfer of the diseased action from the lungs to the brain; that, if the headach continued and increased, it must be considered as a true phrenitic affection, and treated accordingly, with leeches, blisters, purgatives, and such evacuants as the patient's strength seemed able to bear. The next account I received was that of the boy's death, in the way I had expected, under symptoms of oppressed brain and exhaustion, but without any return of the lung affection. Leave to open the body could not be obtained.

The cases I have narrated have all passed under my own observation, and apppear to me to furnish a sufficient specimen of the nature and course of that singular affection which it is my purpose to describe. They are directly illustrative of the pathological principle in question: others bearing a more remote analogy to it have occurred, of which a single example may suffice.

A lady of a fair complexion, and delicate form, was taken, in the early part of her 4th or 5th pregnancy, with stricture and pain in the chest, cough, and feverish heats, which, in despite of occasional bleedings, gentle laxatives, and due attention to regimen, made so considerable a progress, that, in the advanced period of her pregnancy, she had

lost flesh, expectorated with her cough, and had night perspirations; in addition to these symptoms, she sometimes complained of sudden and sharp pains in the head, frequent vertiginous sensations, and momentary unconsciousness. This lady passed through her labour well, and appeared better for a few days; but the fever and pulmonary symptoms returned; and within a week afterwards, these were superseded by headach and delirium, which, in a few more days, put on the form of puerperal mania; and to such a degree, that restraint became indispensably necessary at times. In this form, and without any recurrence of thoracic symptoms, the disease proved fatal within six weeks after delivery.

Her death happened at a distance, in a private establishment for the treatment of insane persons, and the body was not inspected.

Such a series of facts, occurring in little more than ten years, and within a limited sphere of practice, could scarcely fail to excite a deep interest in the mind of the observer. They concur in establishing what appeared at the time a very singular fact; that of phthisis pulmonalis, already in its advanced and ulcerated state, being suddenly and completely arrested in its fatal course, by the supervention of a new disease, of a corresponding character in the brain. At this point of time, and before the new disease has been so far confirmed, as to injure the structure of the brain, it seems that a fair opportunity is very unexpectedly presented to the physician, of a possibility of removing both diseases

by directing his whole attention, and employing prompt and decisive measures for subduing the recent phrenitic affection. I am very ready to admit, that in none of the cases that have been related, has this plan been acted upon with that firmness and decision which my present views would authorise. In the two first it was not acted upon at all; even in the third, where a cure was the fortunate result, the practice, although right in the main, was hampered by that want of decision, which is the sure attendant of variable and obscure views of the nature, and probable consequences, of the change that was going on. It would, indeed, be presumption to think, that the clearest views, guided by the soundest judgment, would secure, or even render success very probable, in a disease in itself complicated, and where two organs, both so essential to life, are concerned. But I must be permitted to offer an opinion, that the favourable result of the third case, together with the healing aspect of the ulcer in the lungs, in one of the two cases submitted to dissection, holds out some prospect of success in those instances where the nature of the change is early and clearly ascertained. It would be flattering to suppose that these observations might so far impress medical practitioners as to lead to success even in rare instances; or, in other cases, to put them so far on their guard, as to lead to rational practice, and to a just prognosis.

I am well aware that the frequent disappointments encountered by the adoption of novel views

and practices, too indiscriminately and ardently recommended by their patrons, have created much caution and diffidence in listening to representations that cannot be confirmed by daily observation. My own conviction of the truth of the views to which these cases have directed me is such, and the points of similarity between the first and third of the cases related, strike me so forcibly, that I feel a persuasion that, had the first been treated upon the same principle, and perhaps with a little more decision than the third, the issue of that case might have been equally fortunate.

It will be remarked that these observations were collected and recorded from notes, several years after the cases had occurred. This happened in the hope of rendering them more impressive by similar histories, followed by dissections, illustrative of their nature. In this I have been disappointed, by the circumstances inseparable from distant country practice, depriving the physician, in many cases, of any tolerable knowledge of the history and course of a disease, subsequent to his visit; and still more of the means of any accurate or efficient inspection of the parts after death.

Judging solely from what has occurred in my own practice, I should be inclined to conclude that this form of disease was not of very rare occurrence, and that there are few persons engaged in extensive practice, but must have had occasion to observe it. On the other hand, it must be admitted to be highly improbable, that, in the face of facts of such prac-

tical value, and establishing a connection between two such important diseases, the attention of the practical physician should not have been awakened to the consequences. This, as far as is known to the writer, has not been the case. It is true that notices of individual cases of this nature are to be found dispersed in medical writings; but they are everywhere treated as isolated facts. They have never been collected, or represented in such a form as is justly due to their practical importance.

Hoffman's chapter, De Generatione Morborum ex Morbis, contains nothing to our purpose: but Dr Mead, in his chapter De Insania, relates a case sufficiently illustrative of the pathological principle in question, of a young lady, suffering under confirmed pulmonary consumption, being reduced to the last state of debility and danger; and, under these circumstances, seized with insanity, which superseded every symptom of pulmonary affection, so that all danger to life disappeared; and when the state of insanity was finally subdued, there was a reasonable prospect of a restoration to perfect health. After some months, consumptive symptoms returned, and these hopes were disappointed. A case of similar import occurs in Dr Quin's inaugural Dissertation, published at Edinburgh in 1779. Dr Cullen's acute and philosophic mind was so impressed with a case of this nature, that was presented to him in private practice, that he was in the habit of relating it in his lectures, every year, in the latter part of his life, but without any at-

tempt to generalize upon it. From a physician of Dr Ferriar's extensive practice and habits of observation, some elucidation of this subject might have been reasonably expected, in a work avowedly written on the conversion of diseases. It is the more remarkable that the connexion between two such diseases should have escaped him, since, in the course of his narrative, he quotes a case, which appears to me of this very nature, from his colleague Dr Percival, who ascribed the disease in the brain, which terminated fatally to his patient, to the succussions of coughing in a confirmed and advanced state of pulmonary consumption, remarking that there was an entire cessation of all pulmonary symptoms, for more than a week before the patient's death.

From all these facts, thus incidentally noticed in medical writings, it seems to be a fair inference that the circumstances of each case had been viewed rather as a coincidence, for which no satisfactory reason could be assigned, than as a conversion of one disease into another, depending on any pathological principle.

These observations have lain aside for many years, and been nearly forgotten. They owe their revival at this time solely to the circumstance of the subject being introduced to the public, in that most interesting and elaborate work on the pathology of the brain and spinal chord, lately published by Dr Abercrombie, in which several cases are given, which

I consider as distinctly illustrative of the principle contended for*. These facts, and the occasion of their being brought forward, go to establish two very essential points; that cases of this nature are by no means so unfrequent, as, from the silence of practical writers, might be inferred; and that the cases above related have not been collected for the purpose of maintaining any preconceived and favourite theory. In making this representation in a letter to Dr Abercrombie, he has added to the value of these observations, by sending me an unpublished case, that occurred in his own practice, with leave to annex it to the other examples I have produced, and which it is evidently well calculated to illustrate. It is as follows:—"A lady, aged about thirty—when I was first consulted about her, was affected with symptoms indicating some deep-seated disease in the bowels. She had a very irritable state of bowels, with frequent attacks of diarrhœa, much pain and tenderness of the abdomen,—frequent pulse and considerable emaciation. These symptoms had continued for some months, when she was seized with pain in the chest and cough, which soon came to be accompanied with copious expectoration, first bloody, and afterwards purulent, and tinged with blood. The symptoms in the abdomen now ceased entirely, but the pectoral com-

* See Dr Abercrombie's work, Cases 29, 45, 55, 56, and 57. (1st Edit.) See also Parry's Elements of Pathology and Therapeutics, p. 385. and 388.

plaints assumed the most alarming aspect; and, in fect, her situation was considered as hopeless. She had severe cough and dyspnœa, the expectoration was most copious; she had a small frequent pulse and hectic paroxysms, with great emaciation. After she had continued in this state for several weeks, she began to talk incoherently, and after a short time she became decidedly maniacal. Her pectoral complaints now subsided rapidly, and after a short time entirely ceased. She continued maniacal, in a greater or less degree, for five or six months, and then got quite well,—and she has now enjoyed excellent health for more than four years."

This case requires no comment, to connect it with the subject which it is introduced to illustrate.

ON

PAINFUL SUBCUTANEOUS TUBERCLE,

BEING A SUPPLEMENT TO A FORMER COMMUNICATION ON THAT SUBJECT.

By William Wood, President of the Royal College of Surgeons, Edinburgh, F. R. S. E., &c.

I am happy to have it in my power to add to the history of Painful Subcutaneous Tubercle, contained in my former communication, an accurate and interesting account of the disease, as it occurs in the mamma, taken from the very valuable work lately published by Sir Astley Cooper, on the Diseases of the Breast*. I am anxious to bring the cases detailed by this justly celebrated surgeon under the notice of the Society, because I have not had an opportunity of seeing the complaint, nor have I been able, previously to his publication, to find on record any distinctly marked case of it in the mamma.

In his chapter on "the Irritable Tumour of the Breast," Sir Astley says†,—"Besides this irritable

* Illustrations of the Diseases of the Breast, by Sir Astley Cooper, Bart. F. R. S. &c. &c. London, 1829.

† L. c. p. 77.

and painful state of a whole or part of the breast, a tumour sometimes is found distinctly circumscribed, highly sensitive to the touch, acutely painful at intervals, more especially prior to menstruation, very moveable, often not larger than a pea, seldom exceeding the size of a marble: generally one only exists, but in other cases there are several similar swellings.

"Although they continue for years, they vary but little in size. I have never seen them suppurate: they sometimes spontaneously cease to be painful, and sometimes disappear without any obvious cause. Upon dissection, they are found to be composed of a solid and semi-transparent substance, with fibres interwoven in it, but without any regular distribution; and I have not been able to trace any large filament of a nerve into them. They seem to be productions of the cellular membrane of the part, rather than of the glandular structure; and they are therefore met with in the cellular membrane of other parts of the body, accompanied with similar painful sensations."

"The diagnosis of this disease," he adds, "is unattended with difficulty; for the pain with which it is accompanied, its tenderness to the slightest touch, or to pressure of any kind, the suffering which succeeds examination, distinguish it from the Hydatid, the chronic mammary tumour, and the scirrhous and fungous tubercle."

Sir Astley proceeds to give a detailed history of

several cases of this affection of the breast, and in illustration of the appearance, &c. of the tumour he adds, *—"In the plate, I have given a view of an irritable tumour taken from the leg of a lady, which I introduce here, because it well illustrates the appearance which these tumours assume: and the symptoms attending them are in a great degree similar to those of the same complaint in the breast. Miss B——, a patient of Mr Brock, of Guernsey, had twice felt a severe pain in her knee, in walking, at a considerable interval. Six weeks after the last attack, she discovered a little tumour, about the size of a pea, below the knee, which was extremely painful on the slightest touch; this I removed nine years ago. Twelve months afterwards she discovered, a few inches lower down in the limb, another swelling, which gave the same impression to the finger as the former, but it was more visible, as it projected the skin more; and it produced, as she expressed it, a scraping and pricking pain, as if numerous lancets were darted into the part, and as if all kinds of pain were there combined. It fortunately lasted only ten minutes at each attack; for if it had continued longer, it would have been intolerable. The second tumour I removed eight years ago; and I had the pleasure of seeing her in October last, at which time she had not had any return of the disease."

Sir Astley Cooper has added to his work several

* L. c. p. 84.

engravings, which exhibit a beautiful and faithful representation of the diseased parts; and in describing the plate, he says,—"Fig. 2d. best exhibits the internal character of these swellings, viz. semi-transparent, circumscribed, texture close, resembling somewhat a nervous ganglion, but differing in its fibrous arrangement."

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